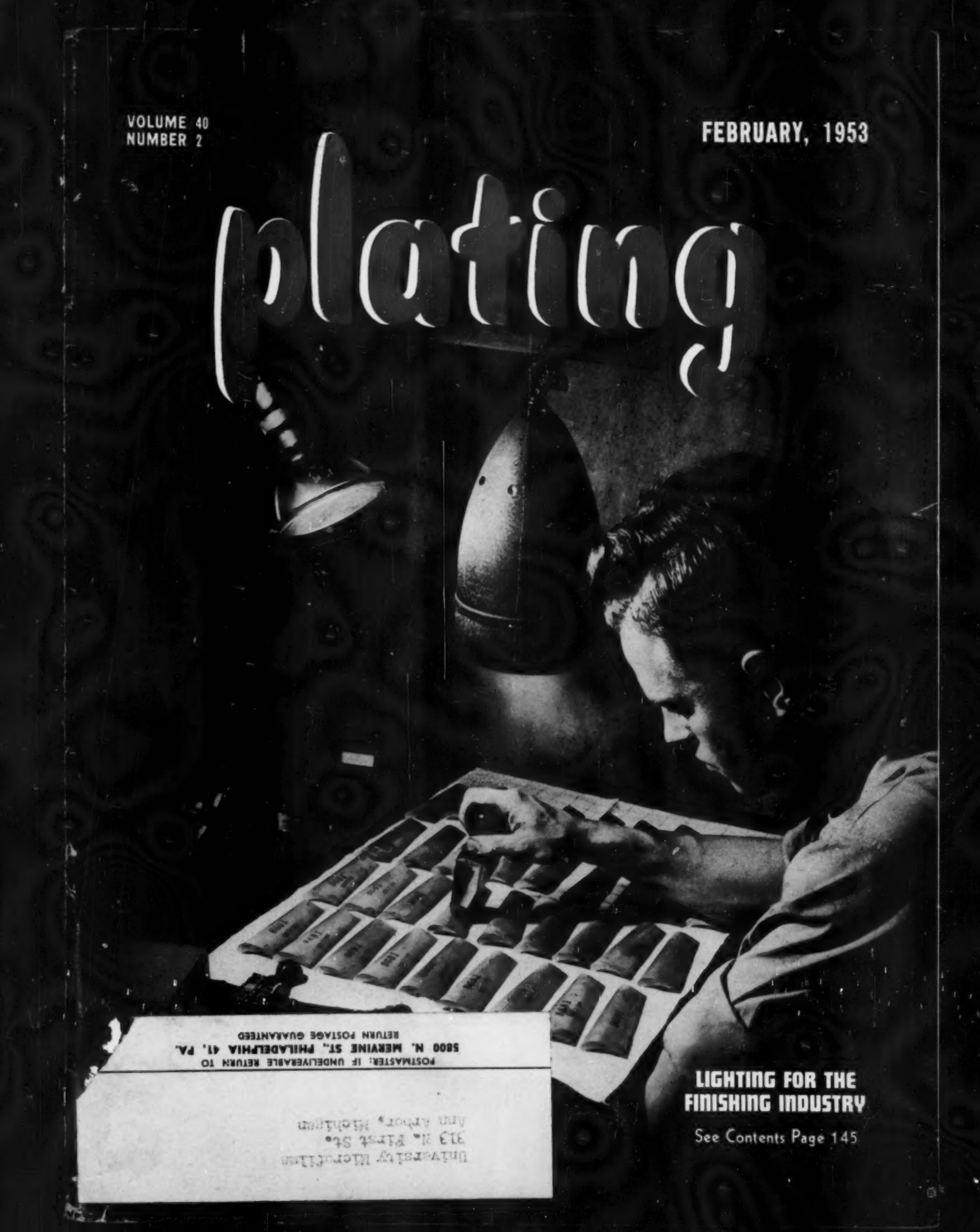
VOLUME 40
NUMBER 2

FEBRUARY, 1953

plating



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LIGHTING FOR THE FINISHING INDUSTRY

See Contents Page 145

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New Catalog and Guide to Metal Preparation for Electroplating and Metal Finishing

CONTAINS INFORMATION ON

Cleaning Compounds,
Cleaning Cycles,
Pickling Compounds,
Plating Solution Analysis,

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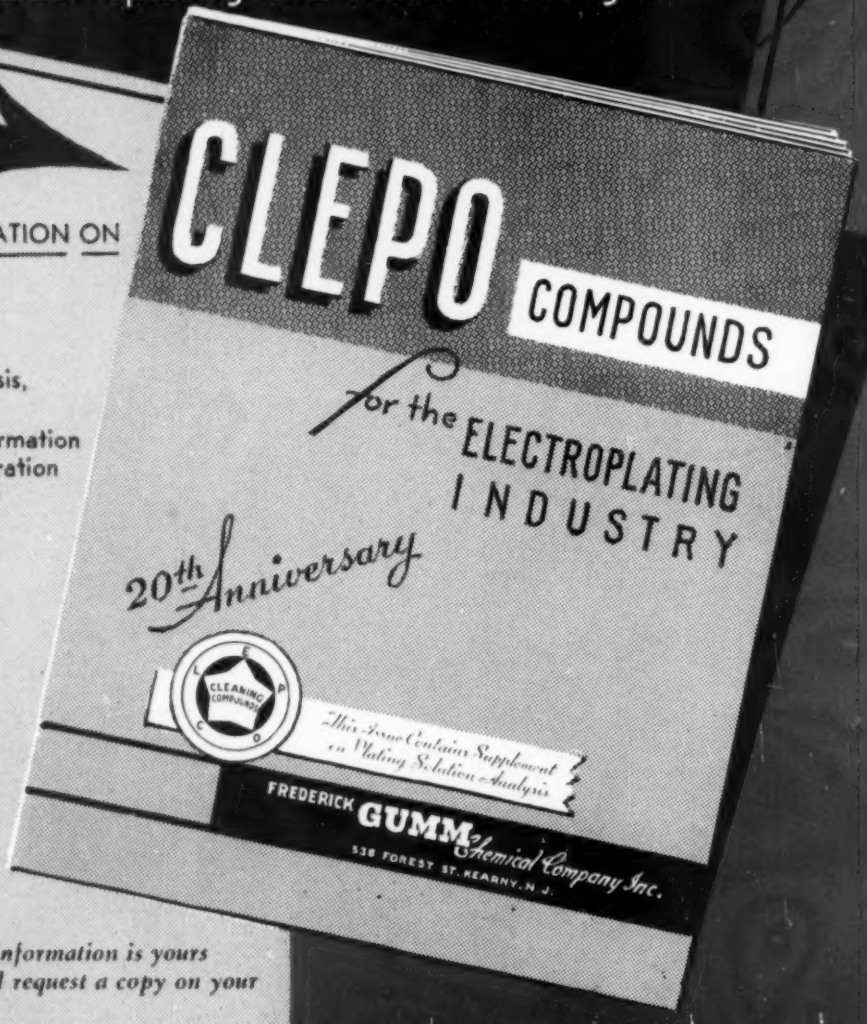
Complete factual information on the Surface preparation of all base metals for all types of Finishing.



This valuable source of information is yours for the asking, if you will request a copy on your Company stationery.

FREDERICK **GUMM** *Chemical Company Inc.*
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AMERICAN CHEMICAL PAINT COMPANY
AMBLER ACP PENNA.

Technical Service Data Sheet
Subject: RUST PROOFING WITH PERMADINE®

Steel parts that have been Permadized and then "sealed" with a rust-preventive oil such as "Granoleum" are effectively protected from rust. And, if the oiled "Permadine" coating should be damaged, rusting will not spread beyond the area of exposure.

Note: Automotive and other rubbing parts subject to friction are usually given "Thermoil-Granodine" manganese-iron phosphate coatings for both wear-resistance and protection from corrosion.

DATA ON THE "PERMADINE" COATING	
Type of coating	Zinc phosphate
Object of coating	Rust and corrosion prevention
Typical products treated	Nuts, bolts, screws, hardware items, tools, guns, cartridge clips, fire control instruments, metallic belt links, steel aircraft parts, certain steel projectiles and many other components
Government Specifications	U.S.A. 57-0-2C; Type II, Class B MIL-C-16232, Type II U.S.A. 51-70-1, Finish 22.02, Class B AN-F-20 Navy Aeronautical M-364 JAN-L-548
Scale of production	Large or small volume; large or small work
Method of application	Dip Barrel tumbling, racked or basketed work
Equipment notes	Immersion tanks of suitable capacity. Cleaning and rinsing stages can be of mild steel. Coating stage can be of heavy mild steel or stainless steel.
Chemicals required	"Permadine" No. 1
Pre-cleaning methods	Any common degreasing method can be used. Alkali cleaning ("Ridosol"), Acid cleaning ("Deoxidine"), Emulsion-alkali cleaning ("Ridosol" - "Ridoline"); vapor degreasing, solvent wiping, etc., are examples. Acid cleaning may need to follow other cleaning methods if rust or scale is present.
Bath Temperature	190° - 205°F.
Coating time	20 - 40 minutes
Coating weight range	1000 - 4000 mgs. per sq. ft.
Technical Service Data Sheets	No. 7-20-1-2 T.M. No. 5

CHEMICALS ACP PROCESSES

WRITE FOR FURTHER INFORMATION ON "PERMADINE"
AND YOUR OWN METAL PROTECTION PROBLEMS

CHEMICALS ACP PROCESSES

In This Issue

The Colorimetric Determination of Cadmium in Effluents by E. J. Serfass, R. F. Muraca and D. G. Gardner describes a colorimetric procedure for the analysis of the metal in the range of 5 to 50 ppm. The method, employing dithizone as the color forming reagent, was found to give satisfactory results in the presence of 500 to 5,000 ppm of each of 27 ions in simultaneous admixture. A modified procedure for the analysis of samples containing as little as 0.01 ppm of cadmium is also included.

A Theory of Hydrogen Overvoltage and Its Relation to the Electrodeposition of Metals by George Dubpernell and Roberta Dubpernell is the concluding installment of a paper (part one appeared in the January issue) in which it is suggested that hydrogen overvoltage is probably not due to hydrogen at all, but to the electrodeposition of minute traces of alkali metals such as sodium. A bibliography of 70 references is included.

Lighting for the Finishing Industry is a picture-caption story with several illustrations of practical examples of the importance of lighting to metal finishing plants. Included are views of general lighting, lighting for inspection, infra-red applications, indicator type service, and the rapidly growing field of specialized lighting represented by germicidal, ozone-producing and suntanning lamps. Also presented is a reference to an ASA standards bulletin.

Disposal of Plating Room Wastes. V. Treatment of Cyanide Waste Solutions by Ion Exchange by Charles A. Walker and Walter Zabban constitutes the first part of a paper which is another in the series of reports on the experimental investigation of methods for disposal of electroplating wastes containing cyanides. The present paper is concerned with the removal of the cyanide ion and metallic cyanide complexes from aqueous solutions by the use of ion exchange resins.

For page number, see Table of Contents, page 145

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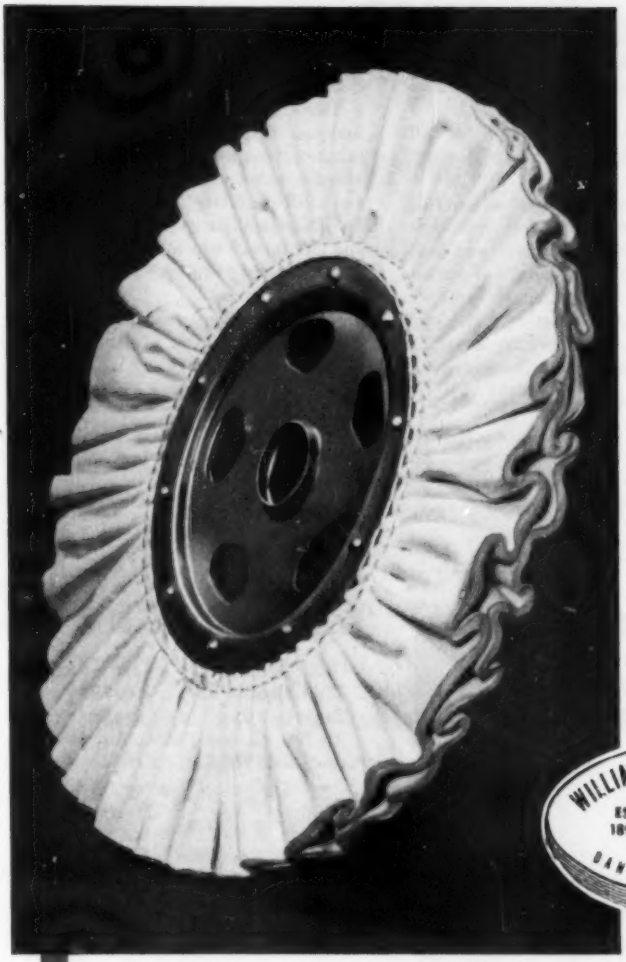

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Industry News

American Wheelabrator Moves District Office. American Wheelabrator & Equipment Corporation, Mishawaka, Ind., announces that its district office in New York City has been moved to 53 Newark Street Bldg., Hoboken, N. J.

The move was designed to provide better service to users of blast cleaning equipment, blasting abrasives, chemical and metallurgical dust and fume collectors, and other supplies for foundries and metalworking concerns which are located in the areas served by this office. Sales engineers David Logan, K. E. Blessing and F. J. Pichard are assigned to the district.

West Coast Aluminum Ingot Sales Office. To meet a growing need for aluminum ingot on the West Coast, the Aluminum Import Corporation, United States sales distributor for Aluminum Company of Canada, Ltd., opened a sales office in Los Angeles.

The new office at 510 W. 6th St., will be in charge of Roy A. Gentles of Toronto.

New Plant for Hewitt-Robins, Inc. More than 2,000 employees and their families attended "open house" and dedication ceremonies of a new one million dollar addition to the company's conveyor belt plant in Buffalo recently. The program consisted of speeches, the unveiling of a plaque, a tour of the company's industrial rubber products plant and refreshments.

The new facilities will increase Hewitt-Robins' conveyor belt production capacity by 41 per cent, and will make the plant one of the largest and most modern in the world.

Foxboro Expansion at Dallas. New factory facilities for the assembly of control valves were recently acquired at Dallas, Texas, by The Foxboro Company, Foxboro, Mass. Convenient to the office address, 1710 N. Akard St., the new quarters practically doubles the area devoted to valve assembly and warehousing, and will facilitate rapid delivery and service to industries throughout the South and Southwest which have been served from the Dallas Branch for over 20 years.

Guest speaker and branch members at November meeting of Bridgeport Branch A. E. S. Left to right: John Mallick, General Electric Co., Bridgeport, Conn.; Robert G. Parker, Casco Products Corp., Bridgeport, Conn.; B. F. Ames, Maas & Waldstein Co., Newark, N. J.; Raymond W. Goral, Enthone, Inc., New Haven, Conn.; Floyd M. Erlenmeyer, Maas & Waldstein Co., Newark, N. J.; George C. Wagstaff, Lock City Electro Plating Co., Stamford, Conn.; and Virgil S. Consalvo, General Electric Co., Bridgeport, Conn.

Change of Name. Morris S. Shipley, President, has announced that effective immediately, the name Industrial Supplies & Equipment Company has been changed to Tumbling Sales & Service Company.

This change has been made, first: to more clearly identify the firm with its special field of activity—Barrel Finishing—and second: to avoid all possible confusion with the many dealers in a wide variety of goods whose names include the words "industrial" or "industrial supplies".

The trade name Tesco has been registered in the United States Patent Office

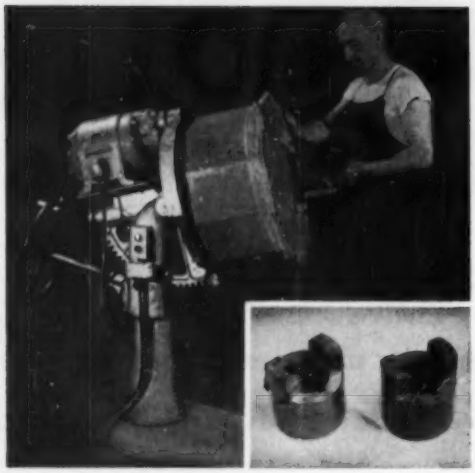
DEBURRING PRODUCTION *increased* 85%

AT BAKER-RAULANG

Leading Manufacturer Of Electric Lift Trucks

with

GLOBE TILTING TUMBLING BARRELS

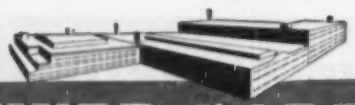


Insulating bushings were formerly deburred with emery wheels at a rate of 300 per hour. With use of a Globe Tilting Tumbling Barrel, production was stepped up to 2000 pieces per hour. In addition to an 85% production increase, the tumbling barrel released two men for work in other departments.

Extra economies are obtained by tumbling odd shaped pieces difficult to deburr with hand wheels. With the Globe Tumbling Barrel, Baker-Raulang has doubled deburring production, and is obtaining finer finishes, using only 3 men in place of 5 men formerly required.

FREE EXPERIMENTAL SERVICE

Let Globe's experimental engineering service analyze your finishing problems. Send samples of parts and completed piece to show finish desired and Globe will provide detailed finishing recommendations. Write today! No obligation, of course.



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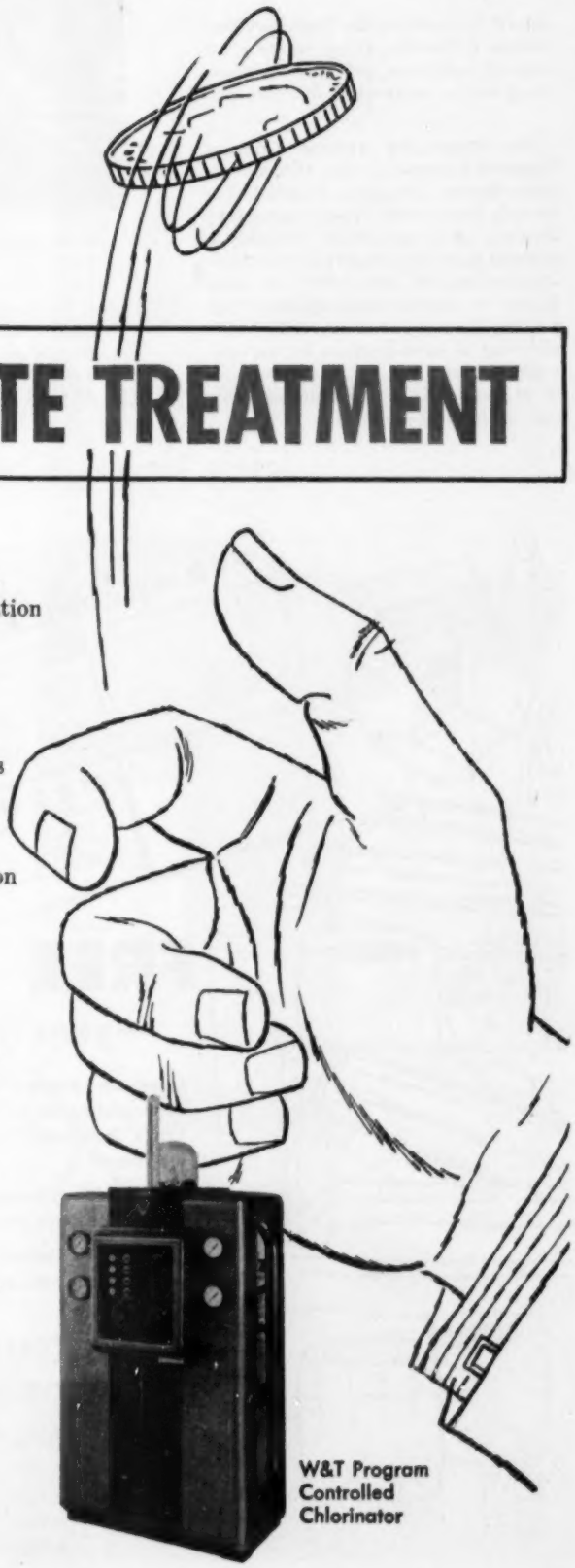

Experience, not guess work, is the basis for the success of Wallace & Tiernan's alkaline chlorination installations for cyanide waste treatment.

CHLORINATION KNOW-HOW

Alkaline chlorination — now accepted as standard cyanide waste treatment practice in the metal finishing industry — oxidizes cyanides by chlorination at controlled pH values. It is effective and economical when properly applied. Since no two cyanide waste problems are the same, the method of applying alkaline chlorination varies. Based on its experience in over 100 such installations, Wallace & Tiernan is prepared to suggest the proper equipment to suit your particular plant.

W&T AUTOMATIC CONTROL

The precision chlorinators for which Wallace & Tiernan has been known for thirty-nine years have been combined with newly developed instruments to make possible the automatic control of alkaline chlorination treatment — an assurance that cyanides are destroyed — and at minimum chemical costs.
Eliminate guess work on your cyanide waste disposal — write today for further information.

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W&T Program Controlled Chlorinator

B-77

and will be applied to the Tesco Tumbling Division in Meriden, Conn., and to a variety of equipment and other products which will be marketed by this company.

New Home for Atwood Vacuum Machine Company. The Atwood Vacuum Machine Company, Rockford, Ill., recently held an Open House inspection of their new plant and offices. The plant is believed to be ultra-modern in every conceivable way—in architecture—in plant layout—in manufacturing equipment—in heating, lighting, and power supply facilities—and in accommodation for the convenience of employees. It has a floor area of 7½ acres—the largest building under one roof in the Rockford area.

Field service representatives from the Canadian, Chicago, New England, New York and Philadelphia sales divisions of Oakite Products, Inc., are shown as they gathered for a series of technical-sales meetings at the Roosevelt Hotel in New York City, December 8–10. Similar conferences held in Hollywood, Calif., and St. Louis during November were attended by representatives from the Company's North Pacific Coast, South Pacific Coast, Southwestern and Milwaukee divisions, and from its Cleveland, Detroit, Midwestern, St. Louis and Southern sales territories respectively

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CANADIAN PERMAG PRODUCTS, LTD., MONTREAL

Wagner Brothers, Inc., manufacturers and distributors of plating supplies and equipment, have retained John D. Tebben & Company, Birmingham, Mich., management consulting firm, with a view toward strengthening their sales organization.

Tebben

Mr. Tebben of the consulting firm which has re-vitalized sales organizations for a number of manufacturers has been collaborating with metal-working industries for many years and is active in American Welding Society, Society of Automotive Engineers, Engineering Society of Detroit and others.

OPPORTUNITY

knocks but once! The men we are looking for know the prospects for mechanical metal-finishing supplies. Their past experience qualifies them for the $10,000.00 bracket. A standout opportunity for real salesmen interested in doing a job and building important places for themselves in our organization. We will give them the kind of support needed for that job. Several territories open. Write now and furnish complete information. *Reply to:*

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McGean bright nickel to give you consistent, economical,
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Tedious, hand or semi-mechanical finishing of precision parts takes time . . . costs money. With the original Roto-Finish process, using Roto-Finish machines, chips and compounds, one man can finish hundreds of parts *at one time* . . . to exact tolerances. The illustrated parts show the diversity in *size*, shape and material in the parts that are *now* precision finished by the Roto-Finish process.

To determine your requirements Roto-Finish maintains a completely equipped laboratory which can (and does) process parts to your specifications. The results we obtain are guaranteed to be duplicated in your plant. This sample processing service is yours without obligation. Just send a few unfinished parts . . . along with a finished part as a guide, for prompt recommendation of the correct Roto-Finish process that exactly fits your requirements.

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Society News

A. S. M. Gold Medal Award

Robert F. Mehl, head of the department of metallurgy at Carnegie Institute of Technology, has been awarded the Society Gold Medal. The award was established in 1943 to recognize outstanding metallurgical knowledge and exceptional ability in the diagnosis and solution of diversified metallurgical problems.

A. S. A. Committee Election

R. C. Sogge, manager of the Standards Department, Engineering Services Division, General Electric Company, Schenectady, N. Y., has been elected president of the United States National Committee (USNC) of the International Electrotechnical Commission. He succeeds Dr. Harold S. Osborne, now president of the I.E.C. The Committee functions within the framework of the American Standards Association.

A. S. T. M. Spring Meeting

Highlights of the Spring Meeting of A. S. T. M. which will be held this year at the Statler Hotel in Detroit, Mich., Wednesday, March 4, are a Symposium on Gloss Measurement sponsored by Committee E-12 on Appearance, and a dinner for A. S. T. M. members and guests sponsored by the Detroit District.

N. F. M. F. Bulletin

The National Federation of Metal Finishers, the new national organization dedicated to the service and representation of the job shop metal finishing industry is now issuing a monthly bulletin under the name of N. F. M. F. Finishing Touches, volume I number 1 having been issued in November, 1952.

A. S. T. E. Annual Meeting

Increased productivity and cost reduction, two vital factors in the economic success of America's industrial production program for many years to come, will be emphasized in the technical sessions at the 21st Annual Meeting of the 23,000 member American Society of Tool Engineers to be held in Detroit at the Hotel Statler from March 17 to 20, 1953.

The 21-paper technical program covers many new fields in which tool engineers are now actively engaged. Among them are papers discussing automatic materials handling equipment, "pushbutton plants" and expense controls.

A seven-member panel discussion in connection with the three-day meeting deals with precision finishing processes, including honing, lapping and superfinishing.

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Personals

Robert R. Sizelove has resigned his position as Vice-President of the F. Gumm Chemical Company. Bob plans to re-activate the consulting firm of Oliver J. Sizelove and Sons, originally established in 1928. The re-activated firm intends to expand its original activities to offer a consulting service in the fields of Industrial Finishing and Industrial Management. The Industrial Finishing section will be headed by Bob Sizelove to offer consulting service on electroplating, metal cleaning, polishing and buffing, barrel tumbling and conversion coatings. The Industrial Management section will be headed by **Oliver J. Sizelove, Jr.**, with consulting service being offered in the fields of plant layout, methods engineering, time study, quality control and wage incentives. O. J. Sizelove, Jr., is at present connected with the Newark College of Engineering as Professor and Executive

R. R. Sizelove O. J. Sizelove

Associate of the Department of Management Engineering, in both the Undergraduate and Graduate Schools. He is a licensed professional engineer in the State of New Jersey.

Charles A. Frawley has joined the sales staff of the Northwest Chemical Company, Detroit 4, Mich., to service accounts in northern Ohio. Mr. Frawley, a native of Cleveland, served with the U. S. Marine Corps in the South Pacific. Since leaving the service, he has earned a degree from Western Reserve University, worked in various capacities with the Ohio Department of Liquor Control, the Pennsylvania Railway, the Klaas Machine and Manufacturing Company and the Waverly Petroleum Products Co.

George H. Russ, sales manager of the Michigan Chrome & Chemical Company, Chemical Division, of Detroit for the past seven years, has retired, due to ill health.

Ruhly Jones

King Ruhly, formerly assistant sales manager, has been appointed sales manager. Mr. Ruhly represented Michigan Chrome in the Chicago area for five years prior to assuming new duties in the home office last March.

Frank Jones has been promoted to the post of assistant sales manager. Jones represented Michigan Chrome in the New England area for five years prior to his appointment. He was instrumental in the successful development and distribution of vinyl plastisols for wire basket coatings.

Philip Del Valle has been named plant manager, Synchro Division, Beckman Instruments, Inc.

Del Valle was formerly project engineer in synchro manufacturing with Doelcam Corporation, Newton, Mass. His experience also includes design engineering with the Ford Instrument Company, Long

WANTED

College graduate in engineering, and experienced in metal finishing. Leading hardware manufacturer located 90 miles from Chicago. Opportunity for right man in progressive plant. State education, age, and experience.

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CAN SELL
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Write today for a specially priced trial order of the ARP Brighteners for any zinc or cadmium plating solution. Or see your Iridite Representative.

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You pay more for corrosion losses than you would for stainless tanks

The success or failure of your plating or processing method often depends upon selecting the most suitable construction material for your tanks. Price is a poor guide. A tank that will corrode and contaminate is dear at any price. What you need most is a material that will last. Look to the years of tank life.

Stortswelding stretches your stainless dollars because it develops the full strength of this fine metal.

42 STONE STREET — STORTS WELDING COMPANY INCORPORATED — MERIDEN, CONN.

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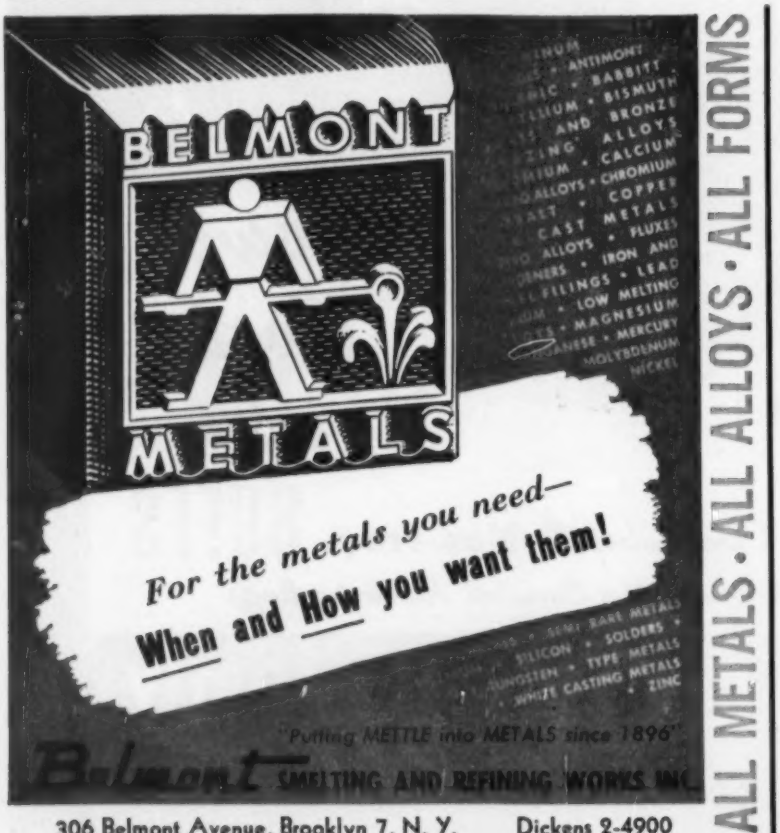


Personals

Island City, N. Y. Del Valle started with Beckman in 1951. He graduated in electrical engineering at Pratt Institute, New York City, 1941, and is a member of the American Institute of Electrical Engineers.

Homer W. Sussman has been appointed general sales manager by the Columbia Electric Manufacturing Company, Cleveland, Ohio.

Sussman

Mr. Sussman joined Columbia as a student engineer in 1935, immediately after receiving his B.S. degree in electrical engineering from Case Institute of Technology, and has held various positions in the engineering and sales departments. He is a member of the American Institute of Electrical Engineers, and Association of Iron and Steel Engineers.

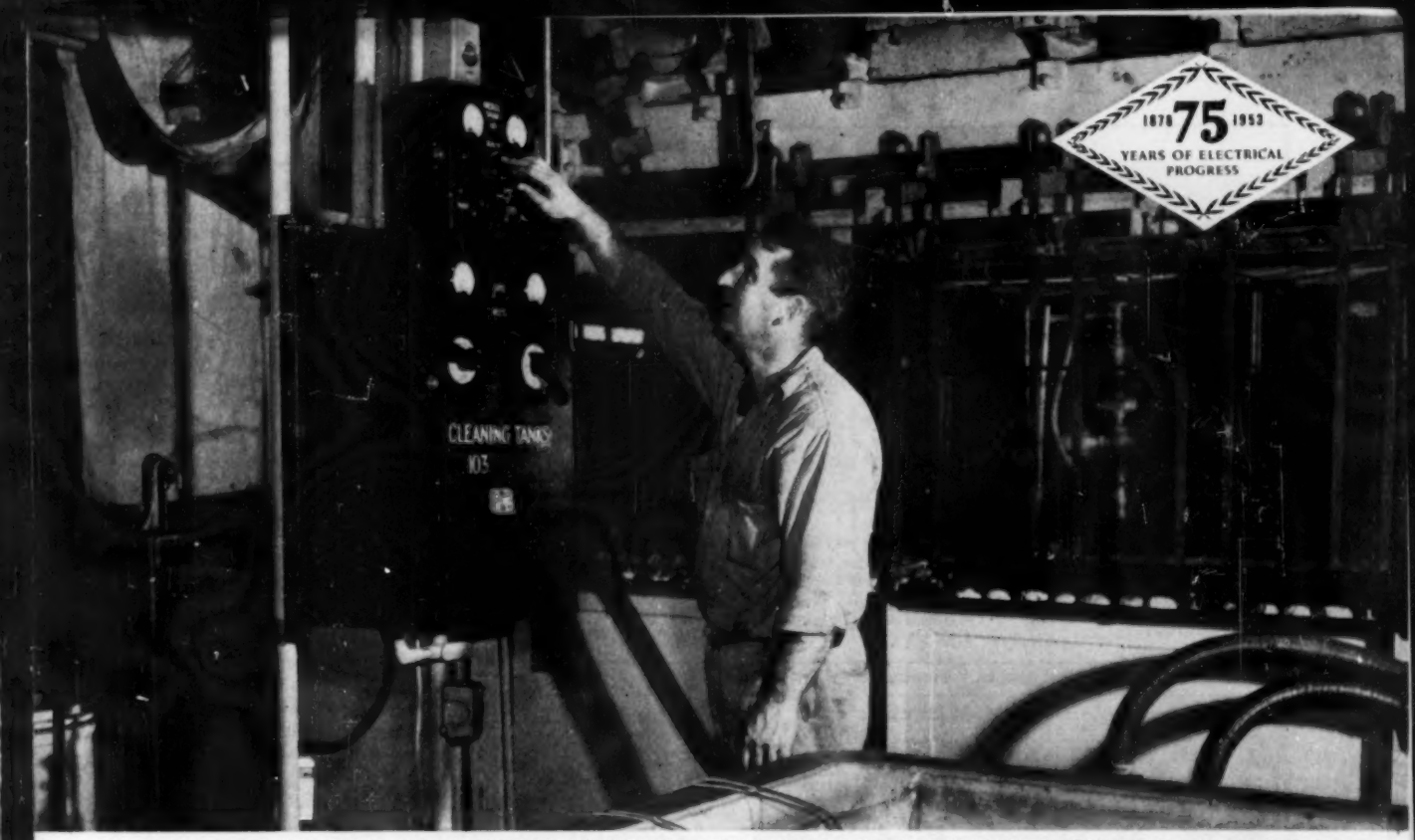
John C. Malajan has joined theDetroit sales office of the Udylite Corporation as sales engineer for the Michigan area.

Malajan

Malajan is a native Detroiter. He was graduated from Albion College with a B.S. degree in chemistry. Following graduation he spent 18 months as a chemist with the U. S. Army, serving in the Pacific Theater. Prior to joining Udylite, Malajan was associated with the Timken-Detroit Axle Company and Standard Oil Company of Indiana.

E. M. Ott has been named manager of a newly organized sales research department of the Pennsylvania Salt Manufacturing Company.

Mr. Ott formerly was manager of the Security Analysis Department. The work of this department has been transferred to the Office of the President. The new department manager, a graduate of Drexel Institute of Technology, joined Pennsalt in November, 1940, and has been engaged



CONTROLS FOR PLATING EQUIPMENT AT GILLETTE SAFETY RAZOR COMPANY ARE CONVENIENTLY LOCATED ADJACENT TO PRODUCTION LINE.

G-E Rectifiers assure steady production reports Gillette Safety Razor Company

G-E PLATING RECTIFIERS, installed in a separate room away from plating area, minimize maintenance. Only occasional inspection and cleaning are required.

"No shutdowns of plating line from current failure"

General Electric metallic rectifiers supply d-c power for electrolytic cleaning, and nickel and gold plating of safety razors at the Boston plant of the Gillette Safety Razor Company.

An automatic conveyor system moves racks of razors through a series of twelve tanks and a dryer. In only 30 minutes, the razors are cleaned, electrolytically cleaned, rinsed, re-rinsed, acid rinsed, nickel plated, rinsed three times, and dried.

To operate with such precise timing, completely dependable equipment is a real necessity. That is why Gillette relies on G-E metallic rectifiers for its d-c power.

STEADY PRODUCTION—"Never have our G-E plating rectifiers caused a production shutdown due to current failure," reports Howard Spaulding, Chief Electrical Engineer at Gillette.

EASY TO MAINTAIN—"Furthermore, the G-E rectifiers require practically no maintenance—only occasional inspection of contacts and switches," Mr. Spaulding adds.

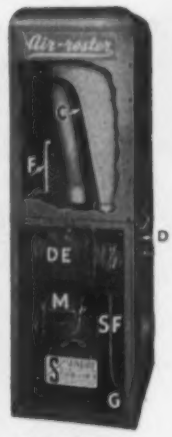
SAVE POWER—Because controls regulate d-c output by controlling a-c input, power is always adjusted to actual load requirements.

FLEXIBLE—Since plating rectifiers need no special foundations, units may be shifted for the most efficient arrangement, as requirements change. G-E plating rectifiers may be tier-mounted if space is at a premium, and additional units can be added if more power is needed.

FOR MORE INFORMATION about G-E metallic plating rectifiers, consult your G-E representative or write to Section 464-11, General Electric Co., Schenectady 5, N. Y.

GENERAL ELECTRIC

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 214.



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FOR SAFETY'S SAKE . . .

ARREST THAT DUST IN YOUR BUFFING—POLISHING—GRINDING OPERATION

Here's the SELF-CONTAINED CYCLONE EQUIPPED STANDARD "AIR-RESTER" for use wherever abrasive dust is involved.

This machine with its material handling fan costs no more than less efficient dust collectors with air handling fans!

CODE EXPLANATIONS

C	Cyclone	D	Removable Drawer
F	Flame proof Filtering Pads	M	Motor
DE	Drawer Enclosure	SF	Suction Fan
		G	Removable Grille

Work Safely! Write today for Bulletin 114.

See us at Booth 660, Western Metal Congress, March 23-27, Los Angeles

THE STANDARD ELECTRICAL TOOL CO.
9325 RIVER ROAD CINCINNATI 4, OHIO

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 215.

INSURE IMPROVED DESCALING & DERUSTING

Without the Hazard of "Strong" Acids!

Before Pickling

After Pickling with Magnus D-Scale-RS

Muriatic and sulphuric acids are the time-honored materials for pickling . . . but they are relatively undependable wherever the consequences of attack on the metal are serious. They are hard to handle . . . hard to store safely. Above all, they are always corrosive fluids, ready to attack humans the instant there is contact with any part of the body.

Use a Solid that is Inert until Dissolved

In plants all over the country, wherever descaling and derusting have to be done, Magnus D-Scale-RS is replacing mineral acids. It is shipped as a crystalline solid, chemically inert until dissolved in water. *Then* it becomes a highly effective pickling acid.

Inhibited Against Attack on Metal

Magnus D-Scale-RS is a fast-acting acid on scale and rust. But it is inhibited against attack on the metal proper. It insures far better pickling action than mineral acids. It is fumeless in use . . . safe in handling and in storage. It can be used either in hot or cold solution . . . in tumbling barrels as well as in tanks.

WRITE FOR BULLETIN #36

The facts it contains will open your eyes to the advantages of pickling in the modern D-Scale-RS way!

MAGNUS CHEMICAL CO. • 41 South Ave., Garwood, N. J.
In Canada — Magnus Chemicals, Ltd., Montreal.
Service representatives in principal cities.

Magnus
CLEANERS • EQUIPMENT • METHODS

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 216.

Personals

in market research and chemical engineering. He served in the Chemical Warfare Service from January, 1942, to February, 1946, being separated from service as a captain.

Norman Dieball, formerly of the Udylite Corporation, is now in charge of manufacture and assembly of electrical and other equipment used by the metal finishing industry.

At the plating order desk **Warren Blazer** replaces **Dave Althouse** who is now one of the sales engineers.

In the San Francisco office, **Dick Coen** has been transferred from the Chemical Department and is now in charge of the San Francisco Metal Finishing Department and will be under the direction of Jack Raskin. **Floyd Browning,** formerly of Schlage Lock Company, is now a sales engineer.

In the Portland office, **Kenneth Humphries,** formerly of the Chemical Division, is now a sales engineer in the Metal Finishing Department.

Henry K. Moore has been appointed Field Engineer in the Southern Philadelphia, Pa., Territory by The Bellows Company. Mr. Moore was last employed by Prima Products, New York City. His new headquarters will be at The Bellows Company, 401 N. Broad St., Philadelphia 8, Pa.

W. C. Lang is now associated with R. O. Hull & Company, Inc., Rocky River, Ohio, as technical representative in Cleveland. Bill Lang is a graduate of Penn

Lang

State in Electrochemical Engineering and was formerly in charge of plating and polishing for the Weatherhead Company, Ward Products Division of the Gabriel Company and Dominion Electric Co.

Carroll C. Parker has been appointed assistant manager of grinding wheel sales for United States Rubber Company's mechanical goods division, with headquarters at the company's Fort Wayne, Ind., plant.

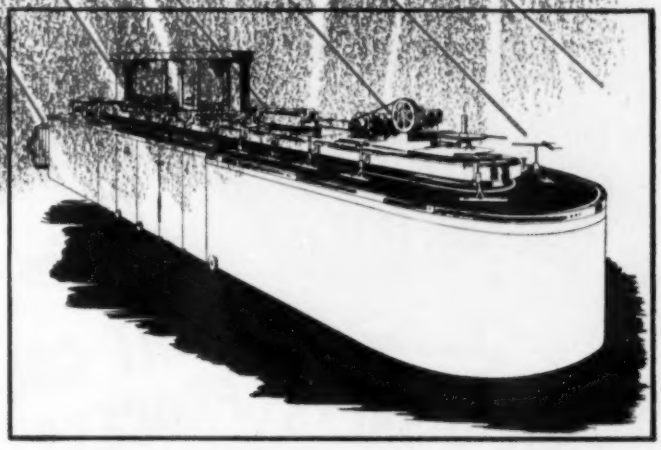
For six years Mr. Parker has been doing sales and service work for the grinding wheel division in northeastern Ohio

LEA

and

Ronal

• • • two pioneering names, each responsible for major contributions in the field of electrodeposition, electroplating and finishing, now identified with three important developments worked out jointly by their respective technical staffs.



LEA is the name by which our company is widely known throughout industry whenever plating, abrading and other allied problems are discussed, for it is in this field that we have specialized for some thirty years. From our research and development laboratory have come many important products and methods, which have resulted in greatly improved plating and finishing operations and lower costs.

RONAL is the name by which a leading company in its field is known . . . a company long specializing in the development of new and unique processes in electrochemical deposition. This company is Ronal Chemicals, Inc., Long Island City, New York.

It was only natural that with Lea's leadership in electrochemical, electroplating and allied fields it should collaborate with Ronal. Lea has joined its research and development organization and its contacts with industry with the scientific 'know-how' of Ronal Chemicals, Inc., from whose laboratory have already come three significant developments in electrodeposition: Ronal Bright Copper, Ronal Bright Silver, and Ronal Bright Gold. These are now being merchandized respectively under the names of Lea Copper Glo, Lea Silver Glo and Lea Golden Glo.

Watch for further developments. Meanwhile if either we or Ronal can be of help in any research or pilot plant studies you are making, do not hesitate to call on us. If your responsibilities cover plating and finishing—and you're not satisfied with the results—perhaps we can help in this, too.

Burring, Buffing, Polishing, Plating and Spray Coating . . . Manufacturers and Specialists in the Development of Production, Methods, Equipment and Compositions. Manufacturers of Lea Compound and Learok . . . Industry's quality buffing compounds for over twenty-five years

THE LEA MANUFACTURING CO.
16 Cherry Avenue, Waterbury 20, Conn.
LEA MFG. COMPANY OF CANADA, LTD.
370 Victoria Street, Toronto 2, Canada

Personals

and the western half of New York State. Before that he was a production engineer and was also with the development department. Mr. Parker is a graduate of the University of Maine.

Fred W. Fraley, a vice-president of Diamond Alkali Company who has been "on loan" to the U. S. Government, has returned to Diamond from Washington.

Mr. Fraley has been serving as Assistant Administrator in charge of the Chemical, Rubber and Forest Products Bureau of the National Production Authority, Department of Commerce. He joined the NPA on March 31 as an assistant director of the chemical division under the rotation principle followed by NPA whereby industry executives are recruited to serve in key administrative positions for temporary periods.

Justus U. Belville has been appointed staff assistant to **J. C. Forsyth,** manager of Alkali Specialty Sales at the company's general headquarters in Cleveland, and **Kemble S. Lewis** has been named manager of the Chicago Branch Sales, the position formerly held by Mr. Belville.

A graduate of Colgate University, Belville joined Diamond in 1941, doing merchandising and specialty sales and service work in Pittsburgh, Pa., area. Following a term of naval service as an officer in World War II, he returned to his previous duties with Diamond in 1946. In 1950 he was promoted to assistant manager of the sales office, which embraces Chicago and midwestern states, a post he held until his recent appointment to Cleveland.

Mr. Lewis has been associated with Diamond since 1947, when he joined the Chicago Branch Sales Office to do technical sales and advisory work on Diamond chemicals for the paint-manufacturing industry. A graduate of the University of Michigan with an M.S. degree in Industrial Engineering, Mr. Lewis is also a veteran of World War II, having served as an army officer with the Chemical Warfare Service and the O.S.S. from 1941 to 1946.

Arthur Murphy has been appointed as a field engineer in the New England area for the Richardson-Allen Corporation,

Murphy

Flushing, N. Y. Mr. Murphy is well known in this region by virtue of his many years' service in the mechanical and electrical industries. His headquarters will be in Boston at 25 Huntington Avenue.

Kenneth R. Blaisdell has been named Field Engineer in the Springfield, Mass., Territory by The Bellows Company. Mr.

Blaisdell

Blaisdell has a varied and practical experience in engineering design, production engineering and industrial sales. He was last employed by the C. A. Bader Company, Hartford, Conn.

Harry I. Hansen has been appointed manager of the Detroit district sales office of the duPont Company's Electrochemicals Department succeeding **Morell Marean.**

Mr. Hansen has been in sales work with duPont since 1937 and for the past nine years has been a salesman in the Chicago area. He started with the company in 1934 in the electroplating laboratory of the Grasselli Chemicals Department, Cleveland, and three years later was made a technical service representative for the metals, ore, and plating division. When the activity of that group was consolidated with the Electrochemicals Department, he continued as an electroplating service man in the Chicago territory, and,

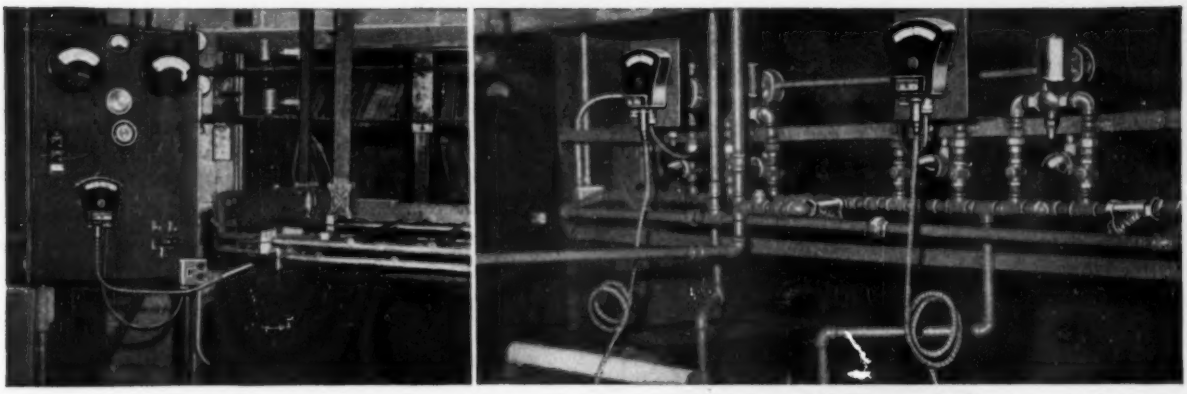
IN EVERY INSTANCE WHERE SEL-REX SILVER SOL-U-SALT WAS INTRODUCED IT WAS ADOPTED AS STANDARD.

SEL-REX SOL-U-SALTS are water soluble in pure crystaline form. Eliminates old-fashioned mixing, calculating or filtering. No objectionable dirt or dust.

SEL-REX BRIGHT GOLD SALTS produces "mirror-bright" deposits in *any* thickness *without* scratch brushing and/or buffing. Uses conventional equipment. Solution is stable and easily maintained.

Write Dept. PL-2 for details on complete line of SEL-REX Gold, Silver, Nickel, Copper, Cadmium and Rhodium Salts and Solutions. Ample stocks for immediate delivery.

Sel-Rex SEL-REX PRECIOUS METALS, INC.
229 Main Street • Belleville 9, N. J.



Sarco controls Heating and Cooling

SARCO *Controls* for PLATING

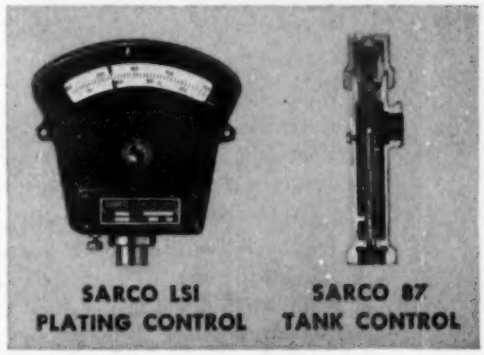
You may not be able to make your present equipment completely automatic but you can make it automatic as far as temperatures are concerned at very small cost. That means that no matter how the temperatures and pressures of your steam and water supply vary, or how you are loading the tanks, the temperatures will be within a degree of the point at which you set the dials of the Sarco LSI Plating Control.

It also means that you can change the settings in a second for each tank and each load. This includes all kinds of plating, and alternate heating and cooling. It means that you can read the temperatures on the big dial, custom-cut, for easy reading in your temperature range.

Sarco 87 Trap Control on Wash Tanks

WASH TANKS . . . DEGREASERS

For wash tanks a low cost Sarco Thermoton hooked into the line like an elbow will hold the tank within a few degrees. And for degreasers you can select the Sarco Vapor-line Controls, or the Sarco TR-40 Cooling Control. To save steam, Sarco Traps and Strainers are recommended for each tank or steam coil.



SARCO LSI PLATING CONTROL

SARCO 87 TANK CONTROL

ASK FOR SARCO BULLETINS ON PLATING CONTROL 270

SARCO SAVES STEAM

SARCO COMPANY, INC.

Represented in Principal Cities

Empire State Building, New York 1, N. Y.

SARCO CANADA, LTD., TORONTO 5, ONTARIO

IMPROVES PRODUCT QUALITY AND OUTPUT

Don't take ANY brand of PLATING ANODES

Here are the reasons WHY!

There is a theory that a man who specializes in mousetraps will build better mousetraps than the one who makes merely wood or metal products. This is the narrow view of the self-conscious specialist.

Others say, "Specialists are those who know more and more about less and less," which invites the conclusion that the greatest specialist of all must be he who knows everything about nothing.

Federated believes that the hundreds of products of non-ferrous origin have a basic family resemblance, and that the more we know about all, the more we know about each. Thus lead is found with silver and antimony, and copper and tin are found with iron. These various elements and others must be separated and refined, or in some cases, discarded. Then, re-combined in different ways, sometimes alone, sometimes with other non-ferrous ingredients, they make brass, bronze and aluminum ingot; solders and type metals; die casting alloys, lead products and bearing metals; anodes for plating and for cathodic protection.

Federated's competent organization of scientists and technicians, its widespread field force of servicemen, and its network of qualified distributors, are unified under the central policy of producing quality products and making these products most useful to every customer from the smallest to the largest.

We count it an advantage to you and to the jobber from whom you buy, that Federated's organization is big enough to specialize in quality control and service from the depths of the mine to the user's shop. It is one of the reasons that the Federated brand is known as coming from "Headquarters for Non-ferrous Metals."

Federated Metals Division

AMERICAN SMELTING AND REFINING COMPANY

120 BROADWAY, NEW YORK 5, N. Y.

In Canada: Federated Metals Canada, Ltd., Toronto, Montreal

Federated first in the non-ferrous field FMD

Aluminum and Magnesium, Babbitts, Brasses and Bronzes, Anodes, Die Casting Metals, Lead and Lead Products, Solders, Type Metals

Personals

in 1943, became a salesman representing all of the department's products.

A native of Cleveland, Mr. Hansen attended the University of Wisconsin and was graduated with a B.S. degree in 1930.

Mr. Marean, who is going into other work, has held several positions in the Electrochemicals Department and has been Detroit district manager for the past two and one-half years.

David P. Blount has been elected as vice-president of chemical sales; **William A. Mays** as vice-president and technical director; and **John D. Holmes** as vice-president of Marine and foreign operations at the recent annual meeting of the Magnus Chemical Company, Garwood, N. J.

Blount

Mays

David Blount was formerly sales manager of Dif Corporation, then joined Red Star Yeast and Products Company as Bakery sales manager. In 1946 he became sales manager of the chemical division for Magnus and two years later was elected to the Board.

Holmes

Mr. Mays, who was formerly associated with Foster D. Snell, Inc., Johns-Manville Corporation and J. A. Tumbler Laboratories, spent several years working in cooperation with Wright Field in setting up cleaning operations for several air fields for the United States Air Force during World War II. He has been with Magnus since 1934. Early in 1948, he was made technical director, and later that year he was elected a director of the company.

John Holmes, in addition to being a director of Magnus, is president of the K. A. T. Corporation, director and secretary of Asphalt Carriers, Inc., and director

GIVE US THIS DATA ON PRODUCTS YOU

Polish or Buff

We'll show you how to do it

FASTER, BETTER, MORE ECONOMICALLY

LABORATORY DATA SHEET

SCHAFFNER MANUFACTURING CO., INC.
Schaffner Center, Emsworth, Pittsburgh 2, Pa.

Gentlemen:

Without obligation . . .

We would like technical information . . . . . ☐
We would like Free Samples submitted . . . . . ☐
We would like Free Technical Bulletin sent . . . . . ☐

We have the following problems.....

.....

.....

.....

If Free Samples are desired please check type:

White Finish ☐ Grease Stick ☐ Tripoli ☐
Emery ☐ Stainless ☐
Spray ☐ Bar ☐ Paste ☐

NAME..... TITLE.....

COMPANY.....

ADDRESS.....

CITY..... STATE.....

We are now using the following compositions:

Manufacturer.....
Type of Material.....
Type..... Cutting ☐
Coloring ☐ Cut and Color ☐
Code Number.....
Automatic ☐ Hand Buffing ☐
Miscellaneous Data.....

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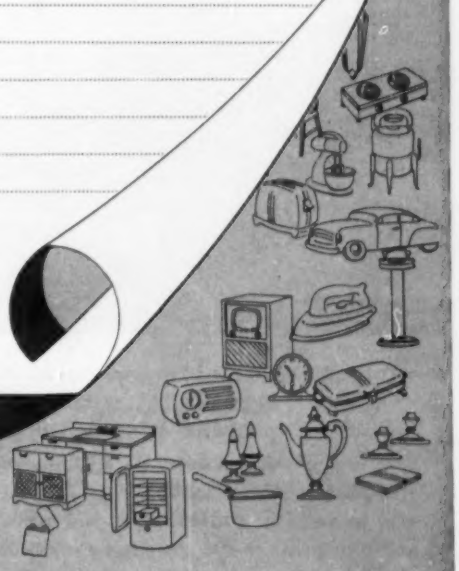

Fill in the above data . . . attach to your letterhead. **MAIL TODAY!**

If you do Polishing or Buffing — you need this important catalog.

Because of our recent *plant expansion* several valuable territories are available—write us confidentially about yourself or your firm.

"Schaffner Bros. make things shine"
Bob — Paul — Gus

Schaffner

MANUFACTURING COMPANY, INC.

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* TRIPOLI COMPOUNDS * CHROME COLORING ROUGE * GREEN ROUGE * JEWELERS' ROUGE * CROCUS COMPOUND * STAINLESS STEEL COMPOUNDS * ALUMINUM BUFFING COMPOUNDS * ALL-PURPOSE BUFFING COMPOUNDS * WHITE COLORING COMPOUNDS * NICKEL BUFFING (LIME) * EMERY CAKE * PLASTIC BUFFING COMPOUNDS * TALLOW GREASE STICK * PUMICE GREASE STOCK * POLISHING WHEEL CEMENT * STEEL POLISHING COMPOUNDS

COMPOUNDS MADE IN BAR, SPRAY OR PASTE

Personals

and assistant secretary of D. J. Tank Carriers, Inc., both of Perth Amboy. He is a member of the National Association of Power Engineers.

John F. Bishop has been appointed Assistant General Manager, Instrument Division, Beckman Instruments, Inc., South Pasadena, Calif.

Formerly head of Special Products Division, he has contributed many new production and product developments in that capacity, including new computer designs and advanced analytical instruments. He received his B.S. degree at the University of California at Berkeley in 1945 and an M.B.A. at Harvard, 1948.

John E. Giere has been appointed to the Udylite Cleveland regional sales staff. Prior to joining Udylite in Detroit in May, 1951, Giere was graduated from

Giere Raskin

the University of Detroit. He formerly resided in Fort Wayne, Ind.

Jack Raskin has been appointed West Coast Manager for the Metal Finishing Division of the L. H. Butcher Company subsidiary of the Udylite Corporation. **Earl Arnold** has been appointed Mr. Raskin's assistant and **Bill Lidtke,** formerly of the Udylite Corporation of Detroit, is outside service representative in the Los Angeles area.

George W. Schwarz, since 1948 vice-president-controller of Wyandotte Chemicals Corporation, has been promoted to vice-president and treasurer.

The functions of treasurer have been handled by **Ford Ballantyne, Sr.,** who will continue to serve as vice-president and secretary of the company, offices he has held for many years.

Schwarz Baker

Schwarz, a resident of Plymouth, Mich., and a native of Brooklyn, N. Y., is a certified public accountant and has served in various accounting capacities with industrial corporations in the Detroit area. In 1925 he joined the staff of Ernst and Ernst, public accounting firm, and in 1938 moved to Wyandotte as controller.

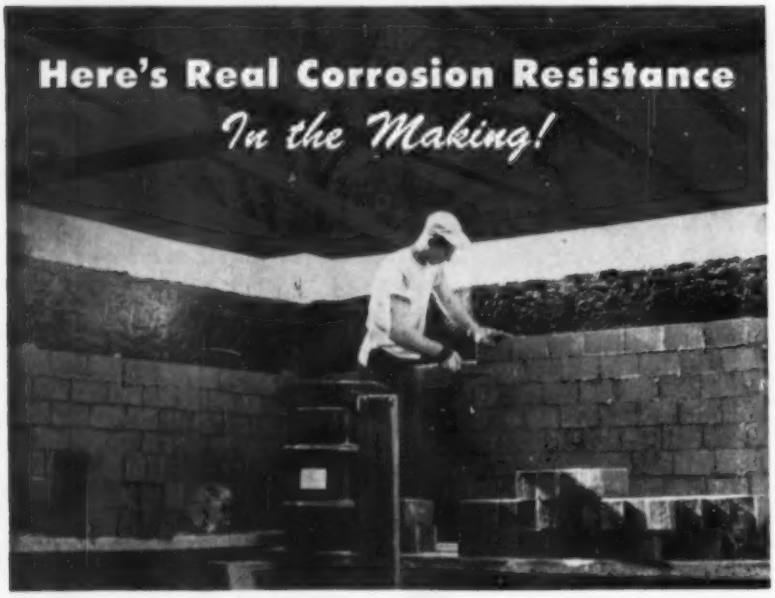
George H. Baker has been elected vice-president in charge of the employee and public relations department.

Baker joined Wyandotte in September, 1950, as director of employee and public relations following broad experience in the field of human relations in both industry and government.

John Kurdenck has been appointed sales manager of the American Rack Company.

Kurdenck

The well-known Mr. Kurdenck brings to American Rack his extensive experience in design and technical use of plating racks and fixtures.



WHEN Oneida Ltd., famous makers of Community Plate silverware of Oneida, N. Y., installed their big new acid neutralizing and recovery tank — they built it to last.

Wisely, they chose U. S. Stoneware's "triple-construction" acid-proof masonry for the job. "Triple-construction" means three-way protection: protection in the brick, protection in the joints, and protection in the membrane between brick and concrete shell.

U. S. Stoneware's furane-based Durisite cement gives tight, thin, non-porous joints of high compressive strength — and top quality corrosion resistance over a wide temperature range. "U.S." Acid Brick are hard, strong and dense—highly resistant to spalling and erosion. Resilon membrane forms an impervious protective barrier between brick and shell.

For economy in construction, and durability in service, specify U. S. Stoneware "triple-construction" acid-proof masonry — positive protection against chemical attack.

U. S. STONEWARE
Akron 9, Ohio
PROCESS EQUIPMENT DIVISION

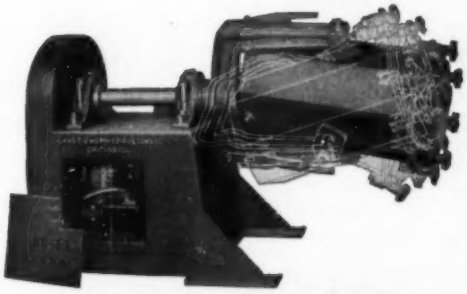
530

USE "RELIANCE" PRODUCTS FOR

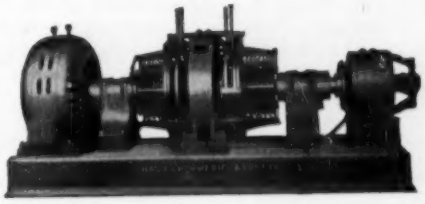
ECONOMY : EFFICIENCY : DEPENDABILITY

LET US SUPPLY YOUR NEEDS FOR YOUR PLATING OR POLISHING DEPARTMENT

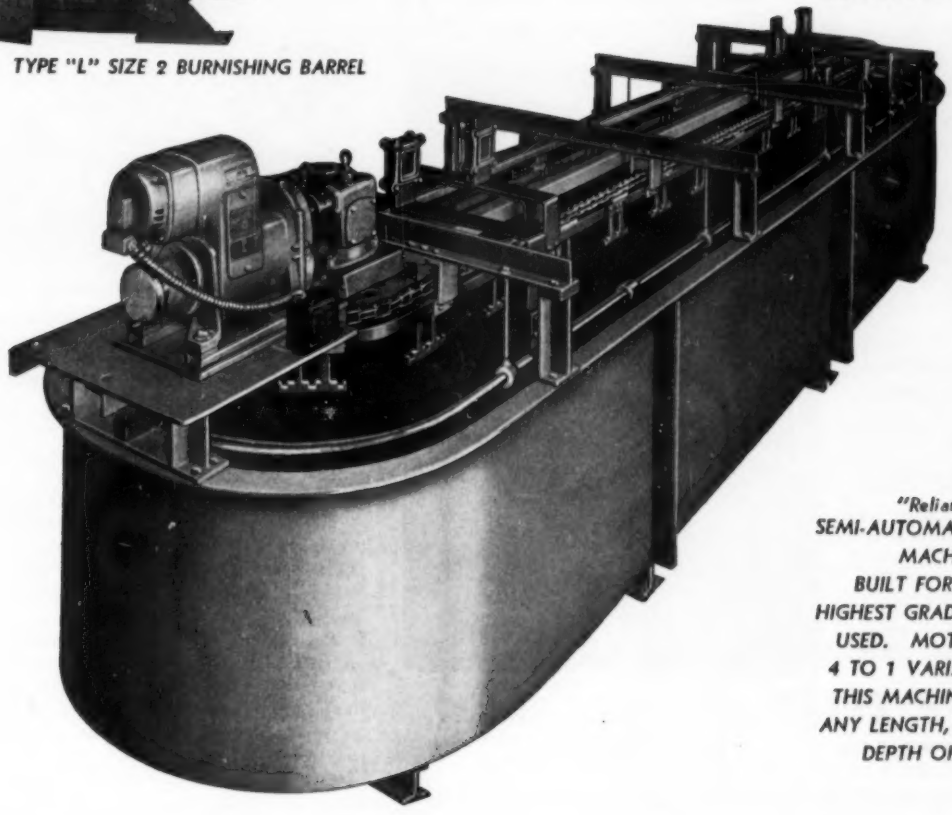
WRITE FOR FURTHER DETAILS



TYPE "L" SIZE 2 BURNISHING BARREL



3000 AMP. 6 VOLT GENERATOR SET



"Reliance"
SEMI-AUTOMATIC PLATING MACHINE
BUILT FOR SERVICE
HIGHEST GRADE MATERIAL USED. MOTOR ½ HP
4 TO 1 VARIABLE SPEED.
THIS MACHINE IS BUILT ANY LENGTH, WIDTH AND DEPTH OF TANK.

Chas. F. L'Hommedieu & Sons Co.

MANUFACTURERS of

Plating and Polishing Machinery

Complete Plating Plants Furnished

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Los Angeles

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 223.

Trade Literature

L—201. Corrosion Proof Process Equipment—The completeness of the fabrication and lining facilities of Heil Process Equipment Corporation, Cleveland, Ohio, are pictorially described in a new bulletin No. 460 just issued by this company.

This bulletin describes the wide range of acid-proof lining materials applied by lining craftsmen in their Cleveland plant. This complete service includes the application of rubber, neoprene, Koroseal, Saran, Heilex 445 (plastic), lead, ceramic brick, structural plastics and alloy fabrications. Bulletin 460 also gives a complete chart of all standard designs for heating and cooling units constructed of Nocordal, impervious graphite. For your copy of this informative bulletin use Reader Service Card.

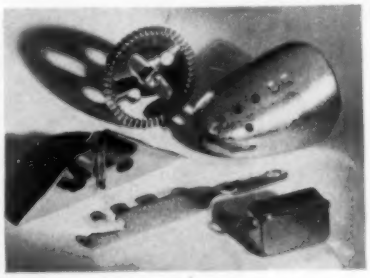
L—202. Tygon Paint Bulletin—The U. S. Stoneware Company, Dept. P, Akron 9, Ohio, has just released a 16-page bulletin No. 730, on Tygon paint. The bulletin also incorporates information on Tygorust, the new "no-prep" vinyl primer, which has created much interest in the field of corrosion-resistant coatings.

Bulletin No. 730 tells where and where not—how, and how not to use the paint and primer. Comprehensive chemical-resistance charts, and an extensive chart on recommended primers and surface treatments should be of great interest to users of industrial corrosion-resistant paints. Readers can obtain copies of this new bulletin by using Reader Service Card.

L—203. Industrial Lighting Bulletin—The latest and most elaborate of a series of "See Better—Work Better" bulletins, designed to promote improved lighting in the nation's industrial plants, has been issued by General Electric's Lamp Division.

"Bulletin No. 8", an eight-page illustrated publication in full color, describes what it calls the "revolution in industrial lighting." Benefits are listed as better workmanship, faster output, reduced spoilage, fewer accidents, and improved employee morale. For your copy of Bulletin No. 8 write the Inquiry Bureau, Section P, General Electric Company, Nela Park, Cleveland 12, Ohio or use Reader Service Card.

L—204. Tin-Nickel Alloy Bulletin—The Metal & Thermit Corporation, 100-P E. 42nd St., New York 17, N. Y., announces



Samples of tin-nickel alloy plating on typical parts.

the release of a new bulletin which details the latest information on the new tin-nickel plating process which is under development in their Research Laboratory.

L—205. New Portable Plating Barrel—The George A. Stutz Manufacturing Company, 1643 Carroll Ave., Chicago 12, Ill., announce the release of new literature describing their new portable lucite plating barrel.

The new portable plating barrel is designed and constructed of high temperature lucite to provide continuous processing of piece parts through the operations of alkali cleaning, water rinsing, acid treatment and plating. It is made in 2 sizes with cylinders having inside dimensions of 6 x 12 inches and 8 x 18 inches. Standard perforations are 3/32 inch. Smaller or larger openings can be furnished as required. All gears are of ½-inch high temperature lucite. Gear bearings are permanently lubricated. Operating temperature up to 185° F. For additional data use Reader Service Card.

L—206. Flexible Metal Hose and Tubing—Publication of a 16 page, illustrated "Quick Reference" catalog, describing American Flexible Metal Hose and Tubing, is announced by the manufacturers, The American Brass Company, American Metal Hose Branch, Waterbury 20, Conn.

RIGHT-HAND MAN TO "BIG BUSINESS"

SUCH AS —

General Motors Corp.
Ternstedt Division
Chrysler Corporation
Chrysler Division
Dodge Division
Motor Products Corporation
Hudson Motor Car Company
Hoover Ball Bearing Co.
Packard Motor Car Co.
Chicago Rawhide Mfg. Co.
General Electric,
Carboloy Department

and many other outstanding metal working industries.

HENRY E. EPLEY
Detroit Representative
of N. Ransohoff, Inc.

At your service if you are located in his territory.

Henry Epley specializes in cutting the three important M's in industry: Money, Manpower and Materials. He has an outstanding record of creatively adapting Ransohoff tailored-to-the-job metal cleaning and surface treating equipment to new time, money and material-saving processes. Henry Epley's individual ability is ably supplemented by over 175 years of technical know-how among his associates in Ransohoff field and headquarters staffs.

N. RANSOHOFF, inc.
EQUIPMENT FOR THE SURFACE TREATMENT OF METAL

5817 Vine Street • Cincinnati 16, Ohio

UNICHROME Trade Mark

News about
COATINGS for METALS
Metallic . . . . . Organic . . . . . Decorative . . . . . Protective

More Reports of Better Chromium Plating

Three ways to "stop-off" for chromium plating

The method generally used in most plants is direct application of an insulating material on the work. The hot dip wax-type Unichrome Stop-Off Compounds, and the quick drying Unichrome Stop-Off Lacquers are favorites here. They're easy to use, hold a sharp line. Others prefer wrapping Unichrome Vinyl Tape around the stopped-off areas. This is fast, convenient, easier to remove. For shielding, formed shields coated with Unichrome Coating 218X, or made from Unichrome Rigid Resist Materials, do an outstanding job—saving time, work and materials.

Platers, too, now benefit from TANTALUM heating equipment

Tantalum is unique. It is actually acid-proof to all commonly used plating room acid solutions except hydrofluoric. It's hard, has high heat conductivity, and resists thermal shock. In the chemical industry, these properties have resulted in over 10 years' service in equipment designed for only 5.

United Chromium made this money-saving metal available to the plating industry in Unichrome Heating Coils and Exchangers with tantalum pipe. Though initially costing more than lead, this enduring equipment can virtually pay for itself by avoiding replacements of lead coils, downtime for installation and maintenance. Ask for more information about this equipment.

HOW TO KEEP CHROMIUM PLATING ANODES ON THE JOB

Chromium plating anodes create no problems where they've been specified with three features that promote good operation:

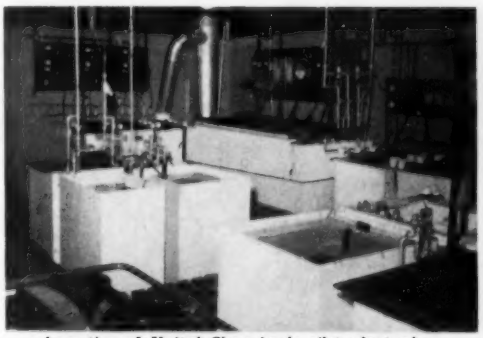
(1) A knife-edge wedge-type hook to assure good contact even on caked anode bars. (2) Enough thickness to give good current distribution and no overheating. (3) Tin-lead alloy to better withstand the action of chromic acid baths during both idle and active periods.

These are among the very features found in Unichrome Chromium Plating Anodes. Data sheet containing full details yours for the asking.

Plating plants confirm advantages of Unichrome SRHS Chromium Baths by test and by actual installations

THE latest check of various plating installations where Unichrome SRHS solutions are used has again verified certain facts about this bath. Namely, the fact that it boosts production. That it reduces operating costs. That it provides a better plate. That it simplifies hard chromium plating operations. For example:

An airplane company tested a Unichrome SRHS Bath for all of the properties ascribed to it. When tests were completed, the bath received highest recommendations. Results confirmed the higher speed of the bath; its superior throwing power; its leveling action, smoothness and hardness; the lower loss of fatigue strength when high strength steel is plated in Unichrome SRHS as against plating in ordinary solutions.



A portion of United Chromium's pilot plant where Unichrome SRHS Chromium Baths were developed

BETTER SPEED—BETTER ADHESION

An automotive supplier reported three benefits of using the Unichrome SRHS Bath for plating piston rings. It plated in half the time formerly required in the ordinary solution. The quality of the chromium deposit was better suited to the purpose. And the plate adhered more strongly to the cast iron base.

ELIMINATED COLOR BUFFING

Plating foreman at another company tells of substantially reducing burning on sharp edges and practically eliminating color buffing since installing the Unichrome SRHS Bath. (This is due to the wider bright plate range of the bath. It means less "burning" or "missing"—fewer rejects.)

SMOOTHER THAN BUFFING

An automotive company compared shock absorber pistons that had first been plated in an ordinary chromium solution and then buffed, with those that had been plated in the Unichrome SRHS Bath. The smoothness of the unbuffed parts was equal to or better than the buffed samples. Here was good proof that the leveling action of SRHS Chromium smooths over minor surface irregularities.

BIG SAVINGS REPORTED

At a well known Connecticut plant, the plating superintendent compared cost figures. Since turning to the Unichrome SRHS Bath, he has been able to show a 30% reduction in operating cost. Also a 5% to 7% reduction in misplates that result from burning, double plate and poor coverage.

★ ★ ★

As these cases indicate, there has been a big difference made in the chromium plating operations of many plants—all through adoption of the Unichrome SRHS Bath. These case histories tell just part of the story. As a self-regulating bath, Unichrome SRHS also minimizes control problems. It maintains itself in peak plating balance. It deposits with less treeing. Through higher cathode efficiency, it also cuts power requirements and increases capacity without extra equipment.

A United Chromium service engineer can tell you more. Write or phone without obligation.

UNITED CHROMIUM, INCORPORATED
100 East 42nd St., New York 17, N. Y.
Waterbury 20, Conn. • Detroit 20, Mich.
Chicago 4, Ill. • Los Angeles 13, Calif.
In Canada:
United Chromium Limited, Toronto, Ont.

Trade Literature

Catalog shows wide range of available alloys and sizes in two basic types, seamless and strip wound, suggested applications, and furnishes data on hose and fittings. Engineering information is also included. For your copy of catalog CC-400 use Reader Service Card.

L—207. Electrodeposition of Nickel at High Current Density—A reprint by The International Nickel Company, Inc., 67 Wall St., New York 5, N. Y., consisting of 16 pages with tables and chart, describes plating with all-chloride nickel and Watts-type baths at 160° F at current densities up to 4260 amperes per square foot. Sound deposits were made by speeding up the flow of electrolyte over the cathode surface as the current density was raised. For your copy use Reader Service Card.

L—208. Hand Pump Bulletin—A new 6-page Blackmer Hand Pump Bulletin illustrates sizes from 7 to 28 gallons-per-minute capacity for pumping vegetable or paint oils, thinners, solvents, cutting and core oils, and industrial liquids from drums, wheel tanks or underground storage. Also shown are models used as refueling systems for power equipment, and mounting accessories for wall, base and pipeline use in plants or as components of manufactured equipment.

Bulletin HP206 is available on request. Use Reader Service Card.

L—209. Karbate Graphite Pipe and Fittings Catalog—National Carbon Company, New York, N. Y., announces the publication of a new catalog section covering Karbate brand impervious graphite pipe and fittings.

The new catalog is profusely illustrated and contains many tables of standard sizes for pipe and fittings, flexible couplings, connectors, parts and accessories, centrifugal pumps and globe valves. Threading and serrating tools and assembled fittings are described and illustrated. Engineering information also is included as a guide in the design and operation of Karbate equipment in the chemical and process industries.

An extremely valuable section of the catalog contains design information on operating pressures and temperatures, allowance for thermal expansion, installation supports, flange connections and permissible flexibility and misalignment by the use of flexible couplings and "Flexlock" joints. An especially valuable chart of "Do's" and "Don'ts" of installation practices is included for ready reference. A copy of catalog section S-7000 may be obtained by using Reader Service Card.

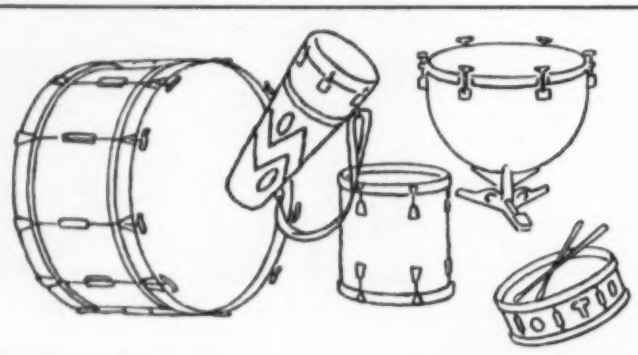
L—210. Metal Cleaning Equipment Bulletin—A new 4-page bulletin describing the complete line of Circo Metal Cleaning equipment has just been issued by the Topper Equipment Company, Clark Township (Rahway), N. J.

The bulletin describes and illustrates Circo vapor degreasers, vapor spray degreasers, liquid-liquid-vapor-degreasers, pit type and conveyorized degreasers. Many features of the Circo line are described in the bulletin such as all equipment being suitable for operation with either perchlorethylene or trichlorethylene degreasing solvents.

Also described are Circo recovery stills, power spray washers, portable hydrospray cleaners and Circo degreasing solvents. For your copy use Reader Service Card.

L—211. New Beckman Computer Catalog—A new illustrated catalog by Beckman Instruments, Inc., South Pasadena 1, Calif., describes applications, methods and features of the Ease Computer. Featured as the lowest-priced quality instrument in its field, this analog computer functions as an equation solver, simulator or testor. For your copy of catalog 309-72 use Reader Service Card.

L—212. Flexible Tubing Catalog—Flexible tubing for ventilation, fume and dust removal, and materials handling is described in a new 8-page bulletin issued by Flexible Tubing Corporation, Guilford, Conn. Catalog C2-4 gives detailed information on Spiratube A and Spiratube R, two types of highly flexible lightweight tubing made from continuous helical coils of spring wire wound with overlapping plies of specially treated multi-coated fabric. The catalog also describes Flexflyte, smaller-diameter tubing for the same uses as Spiratube. It contains de-



All drums look alike!

We've a point to make — one drum of chemicals looks like the next and there is no practical way for you to prejudge the ability of a drum of chemical to do the job you require. For the most part, chemicals are bought on confidence — on the recommendations of responsible chemical suppliers and their engineers

For 10 years Klem Chemicals, Inc. has served important large and small manufacturers of production parts and products. Klem has analyzed countless unusual conditions and successfully produced compounds that have enabled industrialists to eliminate bottlenecks and establish profitable production schedules. Klem has also developed many standard formulae for meeting tough, but not uncommon conditions.

Klem's business has grown on the strength of confidence in their ability to solve problems.

3 OF 20 STANDARD KLEM PRODUCTS

KLEM KOTE No. 240—A new and superior phosphate coating for metal surfaces, assuring better paint adhesion.

BOOTH KOTE No. 69—Coating for dry spray booths—non-inflammable, non-flaking. Provides easy peeling off of accumulated paint.

RUST SOL No. 113—An easy wipe-off process for cleansing and preparing steel for painting. Dissolves oil, soil, rust, etc. Neutralizes surface.

KLEM PRODUCT of the MONTH

STRIP-AID No. 176

Save 50%, add low percentage to your stripper — get fast one-step action. Save materials, labor, heat — salvage rejects, strip accumulated paint from hangers, dollies, at low cost. Write for details.

KLEM Chemicals Inc.
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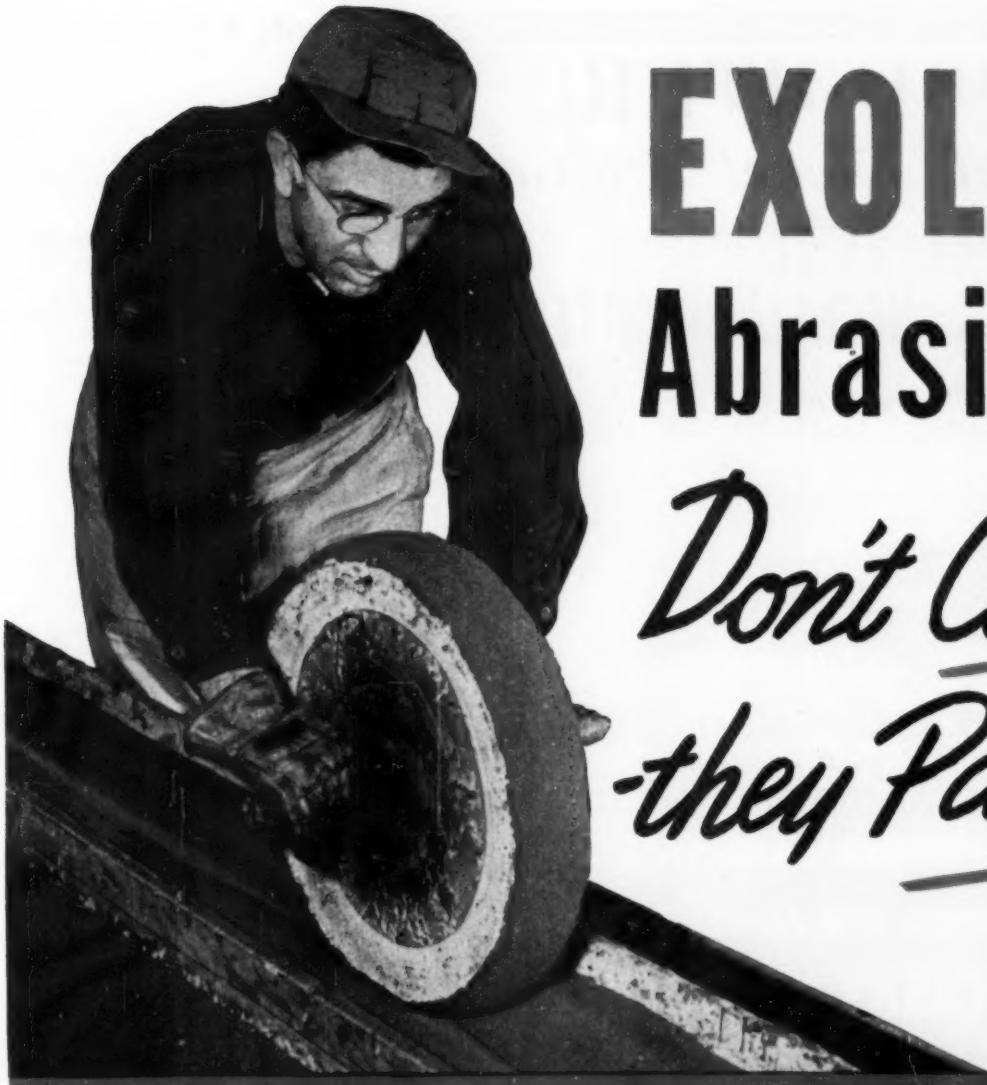

EXOLON Abrasives

Don't Cost -they Pay

More and more metal finishing companies are switching to EXOLON Abrasives. They know that using inferior materials costs more in the long run than EXOLON. It cuts rapidly, uniformly and has excellent resistance to breakdown. EXOLON effects substantial economies in finishing time and abrasive material. Less time is required to surface a given area.

Careful grading, shaping and removal of magnetic elements gives you top efficiency for polishing all kinds of tough metals, including spring steel, sheet metal, cold rolled stock, forgings and stainless steel.

Ceramic coating of RST assures strong adhesion to the set-up wheel. Write today for complete information on EXOLON Abrasives!

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BRIGHTER

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with TRUE BRITE NICKEL BRIGHTENER

Increase Production _____
easy to control . . . cuts down on trouble that entails costly delays.

Save time _____
can be operated at a higher speed.

Reduce Rejects _____
gives unbelievable uniformity of deposit in recesses . . . brighter, whiter color.

Write for **FREE** *bulletin revealing tricks on improving your nickel plating and cutting costs.*

TRUE BRITE CHEMICAL PRODUCTS CO.
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PERMAG services include:
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FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 229.

Trade Literature

tailed specifications, air friction charts, data on oil and chemical resistance, and application information. For your copy of the catalog use Reader Service Card.

L—213. Packing Gland Bulletin—Conax Bulletin PG-1 issued by the Conax Corporation, Buffalo, N. Y., is just off the presses and introduces the new midget packing glands. These stainless steel packing glands are instantly adaptable for sealing the entry of thermometers, thermocouple wells, pitot tubes, static pressure probes, round rods or tubes of any type or even insulated electric lines. For your copy of the bulletin use Reader Service Card.

L—214. Electroforming Difficult Shapes—An illustrated reprint of 4 pages by the International Nickel Company, Inc., New York. Describes the process and details 12 applications that suggest other possibilities in joining, eliminating costly machining, making complex accurate shapes, forming dies, bonding abrasives, reproducing detail and making continuous fine mesh screens. Advantages are shown to apply to such diverse extremes as production runs of pen caps and 70-pound motor mounts. Physical properties, plating solutions and operating conditions are given for copper, iron, soft, medium and hard nickel deposits. For your copy use Reader Service Card.

L—215. Disposal of Spent Sulfate Pickling Solutions is the subject of another manual in the series being published by the Ohio River Valley Water Sanitation Commission to provide authoritative information on treatment methods for industrial wastes. The 76-page illustrated manual describes neutralization procedures in detail, discusses methods for recovery of various by-products and includes appendices on analytical methods and determination of basicity factors. Copies of the manual, priced at $2.00, may be obtained by addressing the Commission at 414 Walnut St., Cincinnati 2, Ohio.

L—216. Maintenance Painting Guide—A quick reference index Maintenance Painting Guide issued by the Wilbur Williams Company, Boston, Mass., in the form of a compact 4-page folder, is available to maintenance superintendents and engineers. Concisely given are maintenance problems of industry and the answer for them listed such as the painting of metal for rust control, painting without odor, protecting concrete floors and walls, protection against chemicals and corrosion. For your copy of this guide use Reader Service Card.

which?

EVERY representative of Green Electric rectifiers also represents a manufacturer of motor-generators. We feel that these companies are qualified to tell you which type of power supply best meets your needs.

- **WALTER R. BINAI,** Indianapolis
- **CROWN RHEOSTAT & SUPPLY CO.,** Chicago
- **W. M. FOTHERINGHAM,** Buffalo
- **INDUSTRIAL CHEMICAL & EQUIPT. CO.,** Minneapolis
- **MUNNING & MUNNING,** Newark
- **WEAVER EQUIPMENT & SUPPLY CO.,** Houston

W. GREEN ELECTRIC COMPANY, INC.

GREEN EXCHANGE BUILDING • 130 CEDAR STREET • NEW YORK 6, N. Y.

RECTIFIER (G) ENGINEERS

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 230.

SPARKLER FILTERS · SPARKLER FILTERS

Can you afford to buy a low-priced plating filter?

In many instances the first cost of a Sparkler filter will exceed that of some other types of plating filters.

But the savings in operating cost soon will more than make up for the difference, and you will find your Sparkler a good investment both on the basis of cost and quality of performance.

For example:

★ Pre-coating Sparkler horizontal filter plates requires only about one-third the amount of filter aid used by some other filters.

★ Only a thin pre-coat is necessary, and you can get brilliant sharp clarity right from the start.

★ Intermittent operation of the filter will not break up the cake on horizontal plates. No renewal of pre-coating is necessary after a period of inactivity.

★ A wide range of fineness of filter media is possible with Sparkler filters.

★ Sparkler filters are ideal for alloy plating solutions. Non-metallic filter plates and rubber lined tanks are available when required.

These are a few of the many operating advantages that make Sparkler plating filters the most economical in labor and material cost and most satisfactory from a standpoint of filtering quality.

An extra set of plates that can be changed in a matter of minutes cuts "down-time" to a minimum.

Sparkler representatives in all principal cities are available for personal service on your filtering problems.

SPARKLER MANUFACTURING CO.
Mundelein, Illinois

Sparkler International Ltd.
Prinsengracht 876, Amsterdam, Holland

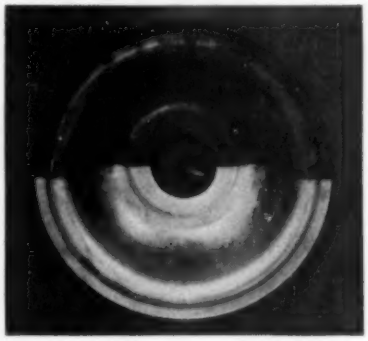
Kamitter & Co.
35 Chittaranjan Ave., Calcutta 12, Indi

Sparkler Western Hemisphere Corp.
Mundelein, Ill., U.S.A.

SPARKLER FILTERS · SPARKLER FILTERS

Equipment and Supplies

E—217. New Acid Derusting and Descaling Compound—Enthone, Inc., Dept. P, 442 Elm St., New Haven, Conn., has announced a product called Enthone



Descaler 2A for rapid removal of oxide and scale from steel. The product is acidic in nature and is available in a dry powder form. It is used in varying concentrations at temperatures ranging from 70 to 180° F depending upon the speed of descaling desired and the type of scale.

The manufacturer states that the product is ideal for tumble or barrel derusting or descaling. It is also used for removal of rust or scale in vats or tanks, for primary pickling or for plating cycles. A layer of foam forms on the pickling solution which practically eliminates fumes, thus making the pickling or descaling operation more pleasant to the operator and reduces corrosion on surrounding equipment.

Descaler 2A presents much less hazards in handling than those present with the handling of acids, such as hydrochloric or sulfuric acid. Further information on the product can be obtained by using Reader Service Card.

E—218. High Flash Point Emulsion Cleaner—Pennsalt EC-54, a new type of emulsion cleaner which will not boil off, evaporate or flash at use temperatures, has been developed for metal cleaning by the Pennsylvania Salt Manufacturing Company.

EC-54 will clean non-ferrous metals without tarnishing and will protect ferrous parts from in-plant rusting. An emulsifiable liquid, the product has a flash point of 260° F, a fire point of 300° F, and 95 per cent boils within a range of 500° to 600° F.

Particular advantages from these characteristics are that there is negligible loss through evaporation; no solvent vapors condense on plating tanks; the fire hazard is minimized during shut-downs or in

ACME *Rotary Automatics* ARE AVAILABLE IN EITHER INDEXING OR CONTINUOUS TYPES ...TO MEET A WIDE RANGE OF PRODUCTION REQUIREMENTS

This ACME 10-ft. Combination Rotary, may be used for either indexing or continuous operation. It is equipped with 24 continuous revolving spindles for continuous rotary travel or for twelve station indexing operation utilizing every other spindle. When indexing, this table travels station to station with one second interval and up to 1200 indexes per hour.

CATALOGS ON REQUEST

511-12-1

ACME *Automatics* CAN HELP YOU SOLVE PRODUCTION FINISHING PROBLEMS

A great many production finishing problems involving polishing, buffing, grinding, wire brushing, de-burring and micro-finishing can be best solved by means of ACME Automatic machine arrangements.

ACME experience in working out effective solutions to a wide variety of production finishing problems and in developing and building machines to do the job automatically is at your service. ACME leadership has been earned by years of performance . . . and ACME Automatics can be relied upon for rugged dependability.

For recommendations, send blue prints of part or samples before and after finishing, together with detailed information on finishing operations and production requirements. If production methods will cut your costs, we can set your job up in our experimental processing department and you can inspect the machines in operation.

ROTARY STRAIGHT LINE SEMI-AUTOMATIC AND SPECIAL *Polishing and Buffing Machinery*

SPECIAL MACHINERY AUTOMATIC BUFFING MACHINES

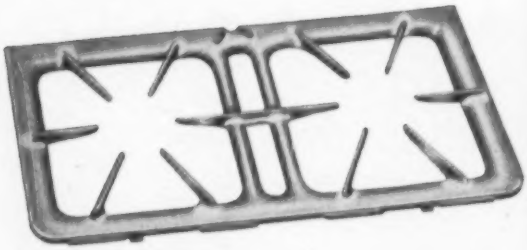
ACME *Manufacturing Co.*

1400 E. 9 MILE RD., DETROIT 20 (Ferndale) MICH.

Builders OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR NEARLY HALF A CENTURY

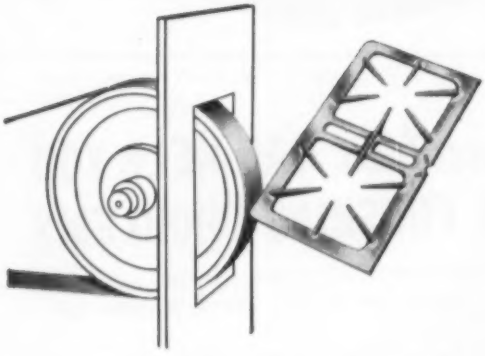
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 232.

How would you SOLVE IT?

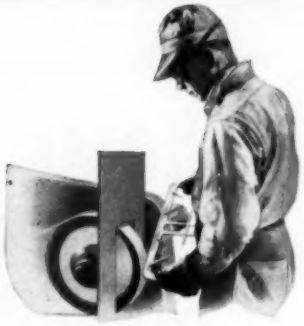


PRODUCTION PROBLEM: To cut unit costs of finishing stove top grids and produce a more uniform finish. (Manufacturer found conventional grinding wheel turned out only 50 units per hour, left unsatisfactory finishes, fatigued operators.)

1 A 3M Representative analyzed Mount Vernon Furnace Company's grinding and finishing operations, and made the following specific recommendation:



2 He advised this company to convert to the 3M Backstand Method using fast-cutting 3M Belts (#36 Three-M-ite resin bond, size 3" x 132") and special rubber contact wheel.



3 Now this Illinois manufacturer uses the 3M Method to turn out 100 grids an hour (twice as many as previous method!) with more uniform finishes. Grinding is safer. There's less operator fatigue. A 3M Representative can help you reduce your production costs, too. His services are available without cost or obligation.

WANT MORE INFORMATION?

Minnesota Mining & Mfg. Co.
Dept. PL-23, St. Paul 6, Minn.

Return this coupon for additional facts on 3M Abrasive applications.

☐ Have 3M Representative call.

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MINNESOTA MINING & MFG. CO.
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In Canada: London, Ont., Can.
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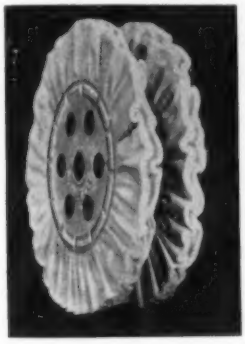
Makers of "SCOTCH"® Pressure-Sensitive Tapes • • "SCOTCH"® Sound Recording Tape
"3M"® Adhesives • "UNDERSEAL"® Rubberized Coating
"SCOTCHLITE"® Reflective Sheeting • • "SAFETY-WALK"® Non-Slip Surfacing

drains or sewers, and the cleaning solution can be used at higher temperatures to assure maximum detergency on high melting point soils.

Ferrous parts cleaned with EC-54 are protected against in-plant rusting for a period of one to six weeks. This period can be lengthened by the use of stronger solutions and by omission of the rinse following the cleaning stage.

On non-ferrous metals, it will not tarnish aluminum, magnesium, brass or zinc. One cleaning unit can be used to process all metals in a given plant. For additional details use Reader Service Card.

E—219. New Ventilated Buff—The Hanson-Van Winkle-Munning Company, Matawan, N. J., announces a new self-ventilating buff which enables faster buffing and reduces buff wear. The new buff, known as Ruff-L-Buff, may be used for hand or machine operation.



The ventilating feature also results in the use of less buffing composition as the composition binder is not volatilized through excessive heat.

Cloth used in making the buffs is cut diagonally to the threads. This "bias construction" exposes to the work the maximum number of thread ends, thus getting more cutting action per revolution.

Other features of the buff are: perfect balance for uniform rotation and wear, steel-ring anchor to secure the cloth to the fibre-board center, and exclusive Red-E-To-Use face which takes composition immediately without the necessity of evening the buff surface and impregnating it with composition. For further information on the new buffs use Reader Serivce Card.

E—220. Improved Work Glove Coating—An improved Neox coating (reinforced neoprene) is now being used on Edmont's complete line of black Neox coated fabric work gloves. The new formula is more flexible and has better gripping qualities. It is produced by using special additives with a neoprene base. It

Specialists in Industrial Cleaning Products

Paint does not chip or crack on PRE-FOS treated steel.

"SUPERB PAINT ADHESION *after cleaning and phosphating with* WYANDOTTE PRE-FOS"

says Mr. S. L. Wigodner (right) of L. J. Segil Co.

HAVING trouble with paint adhesion? Then read the report of Mr. S. L. Wigodner, purchasing agent of the L. J. Segil Co., Chicago lighting-fixture manufacturers:

"We can repeatedly bend pieces of steel, which have been treated with PRE-FOS* and then painted, without breaking the paint film loose. We are very pleased with the results of using PRE-FOS.

"Previously, we had tried most of the other available phosphating cleaners with indifferent success. Not only has PRE-FOS given us superb paint adhesion, but also excellent cleaning and corrosion protection. We have found PRE-FOS economical and the solution easy to maintain and control."

Versatile

Wyandotte PRE-FOS performs well in hard or soft water, in spray washer or soak tank. It has long solution life, rinses freely and completely, prevents rust of steel parts in process, and prepares metals for paint.

If you're painting metals, investigate PRE-FOS. Also ask your Wyandotte representative about our full line of products for better metal cleaning. *Wyandotte Chemicals Corporation, Wyandotte, Michigan; also Los Angeles 12, Calif.* * Reg. U. S. Pat. Off.

CLEANING THE WORLD

Largest manufacturers of specialized cleaning products for business and industry

Wyandotte CHEMICALS

Helpful service representatives in 188 cities in the United States and Canada

LOW COST
IRIDITE
FINISHES

for zinc, cadmium, aluminum and cuprous metals

provide corrosion resistance
paint base
choice of appearance

And they are easy to apply! Just a simple chemical dip for only a few seconds produces the coating.

LOW MATERIAL AND SHIPPING COSTS

combine to make Iridite the most economical chromate finish you can buy. Many Iridite chemicals are packed in powder form, thus can be shipped to you in steel pails at freight savings of up to 75%! Pails take less storage space, are easier to handle, eliminate carboys, need not be returned.

WHY NOT TEST IRIDITE ON YOUR PRODUCTS? Write for literature and send samples for free test processing. See "Plating Supplies" in your classified telephone directory or write direct.

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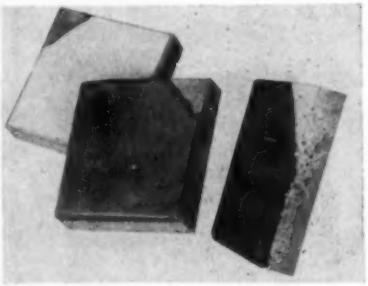
Equipment and Supplies

is far more resistant to cuts, abrasions, grease, acids, caustics, solvents and heat than neoprene alone.

Two weights of coatings are available to meet a wide range of service requirements. Full range of styles from knit-wrists to 14 inch gauntlets. Fully or palm coated. For additional information write Edmont Manufacturing Company, 1250 Walnut St., Coshocton, Ohio, or use Reader Service Card.

E—221. Corrosion Proof Surfacing Material—A new trowelled-on surfacing material promises to become a widely accepted substitute for acid-proof brick. The material, known as Ceilcrete, is a combination of synthetic liquid resin, inert fillers and pigments and cures into a hard dense stone-like corrosion proof sur-



face that will withstand trucking, foot traffic and abrasion with a rated load carrying strength about four times greater than that of dense concrete. Its greatest usefulness is in its application to walls and floors that are subject to corrosive liquids or atmosphere, such as are found in metal finishing, plating, rayon, cellophane and petro-chemical industries. It is available in black and colors, and is manufactured by Ceilcote Company, Cleveland 9, Ohio. For additional information use Reader Service Card.

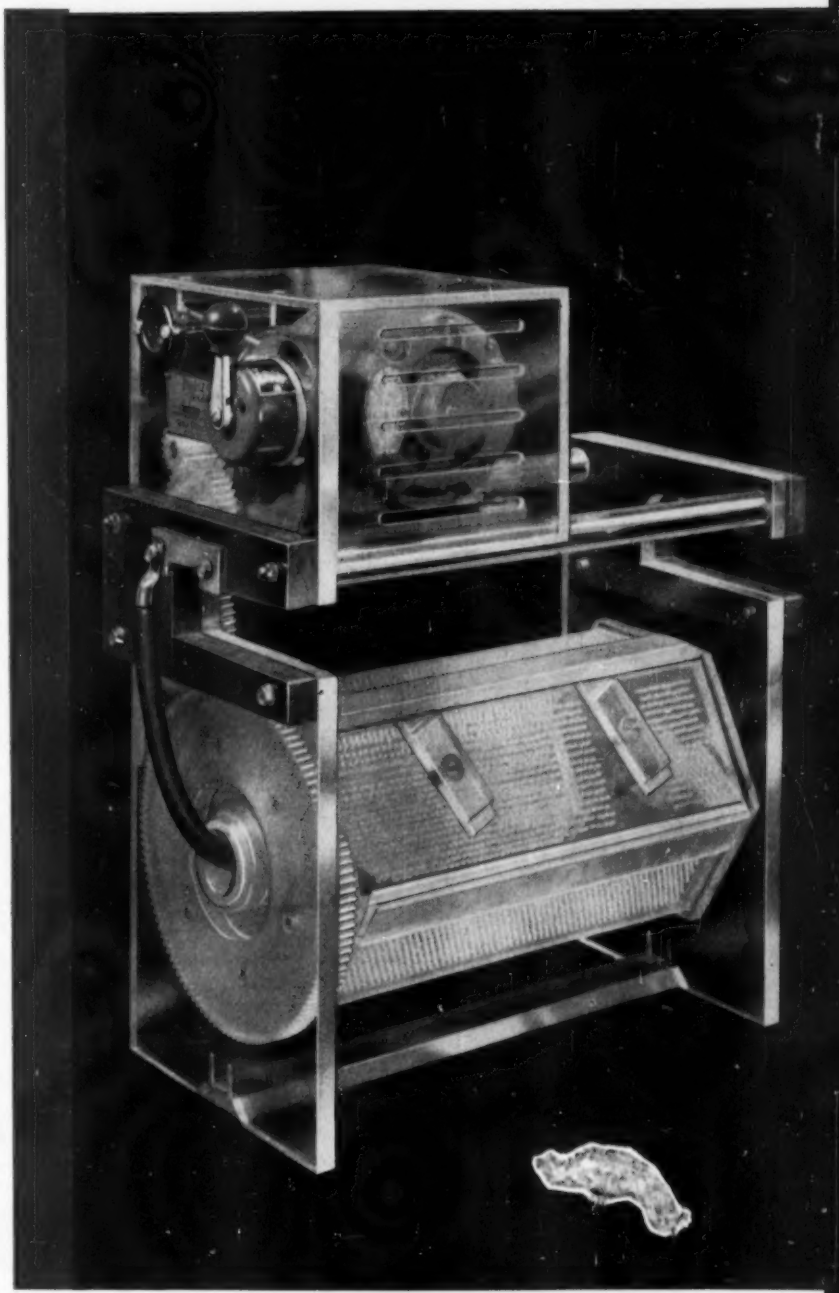
E—222. Corrosion Resistant Exhaust Manifolds and Ducts—are now available in all-plastic, fully rigid construction, from the American Agile Corporation, Bedford, Ohio. Fabricated from polyethylene or unplasticized polyvinyl chloride, both of which offer excellent resistance to the corrosive action of a great number of chemical reagents, they are made to customer's specification, both of square or round design, and shipped to the site of final installation in easy to assemble sections. For additional information, literature and prices, use Reader Service Card.

E—223. Plasticized Polyvinyl Chloride Sheet—The Atlas Mineral Products

NEW NEW NEW

THE STUTZ PORTABLE PLATING BARREL is designed and constructed of High Temperature Lucite to provide continuous processing of piece parts through the operations of Alkali Cleaning, Water Rinsing, Acid Treatment and Plating. Progression through these operations is made by manual handling or if necessary with the assist of an overhead traveling hoist. The Stutz Portable Plating Barrel is made in 2 sizes with cylinders having inside dimensions of 6" x 12" and 8" x 18". Standard perforations are 3/32". Smaller or larger openings can be furnished as required. All gears are of 1/2" High Temperature Lucite. Gear bearings are permanently lubricated. Operating temperature up to 185° F.

WRITE FOR OUR NEW ILLUSTRATED LITERATURE
SHOWING THIS AND OTHER DESIGN ARRANGEMENTS



DESIGN NUMBER ONE

Cylinder suspended and rotated between heavy side frames designed to serve as a stand support. Side frames are firmly fixed and further braced with a bottom tie bar thereby providing rigid bearing stability.

Manufactured by:

George A. Stutz Manufacturing Company - 1643 Carroll Avenue - Chicago 12, Illinois

Equipment and Supplies

Company announces the commercial availability of a new type plasticized polyvinyl chloride sheet to supplement its present series of Atlastavon Linings. The new product will be designated Atlastavon 20 and will be installed by approved applicators, as well as at the Mertztown and Houston Lining Shops. This product is resistant to alkalies, corrosive salts and most acids including nitric and chromic acids. It is applied by a new technique developed as a result of over three years of research. For information use Reader Service Card.

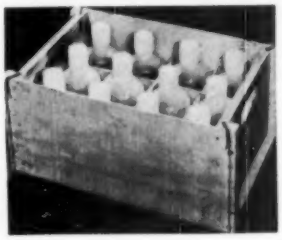
E—224. Low Priced Work Bench—A sturdy new, economy priced work bench has been announced by the Shore Woodwork Company, Philadelphia. The new table has a satin-finish top of laminated hard maple, reinforced with bolts and is secured to a girder-construction base that can be screwed or bolted to the floor if desired. Special sizes and shapes can be manufactured to order. For more complete information use Reader Service Card.

E—225. Spiral Nozzles—A patent has just been issued to Bete Fog Nozzle, Inc., Greenfield, Mass., covering its line of

improved fog nozzles. As with earlier models, the spiral element shears a continuous film of liquid from a solid jet to form a fine fog of uniform drop size. The Bete Company is now manufacturing 47 different models of the spiral nozzles in flow rates from 1 to 1000 gpm for chemical processing, washing, cooling, treating gases and many other industrial applications. For more information use Reader Service Card.

E—226. Twin Barrel Finisher—Rampe Manufacturing Company, Cleveland 14, Ohio, have rounded out their line of tumbler-mixers by the addition of a standard size twin-barrel finisher. This sturdily built machine will handle steel burnishing balls in both barrels, has a ball bearing variable speed drive with power furnished by a 3/4 h.p. 220 volt 3-phase motor. Starting button is completely waterproof. Standard barrels as furnished with this machine are 10¾ inch x 17 inch size. Larger barrels can be supplied, if desired. Barrels are attached by four bolts each and are furnished either unlined or vinyl plastic lined with safety type cover which prevents pressure from building up in the barrels. For complete information use Reader Service Card.

E—227. Wirebound Bottle Case Cuts Cost and Weight—Seen as a boon to shippers of liquid chemicals, etc., is the new, low-cost light-weight wirebound container designed and produced by the



American Box Company, Cleveland. It is the first "wirebound" of its type to replace the old, heavier, more expensive, conventional nailed-wood box. The container is an open-top "wirebound", compartmented for holding 12 polyethylene reagent bottles. Hand holes are provided for manual handling, and a dark-colored acid-resistant coating is applied to protect the case for long service. For additional information use Reader Service Card.

E—228. Miniature Circuit Breaker—Mini-Breaker is a new permanent type circuit protective device that fits like a fuse in any standard Edison base fuseholder delivering up to 125 volt a.c. service. It requires no additional equipment and no special wiring when applied to branch or main circuits of corresponding 15, 20, or 30 ampere ratings. Anyone can install it in a matter of seconds, and anyone can restore electrical service simply by pressing in and releasing its shock proof reset button. Designed primarily for direct fuse replacement use on existing residential, commercial, and industrial

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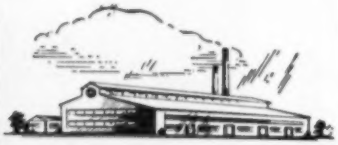

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Top quality buffs are just one of many results of over eighty years of constant electroplating and polishing development—a continuing policy summed up in H-VW-M Platemanship . . . your working guarantee of the best that industry has to offer—not only in buffs—but in every phase of plating and polishing.

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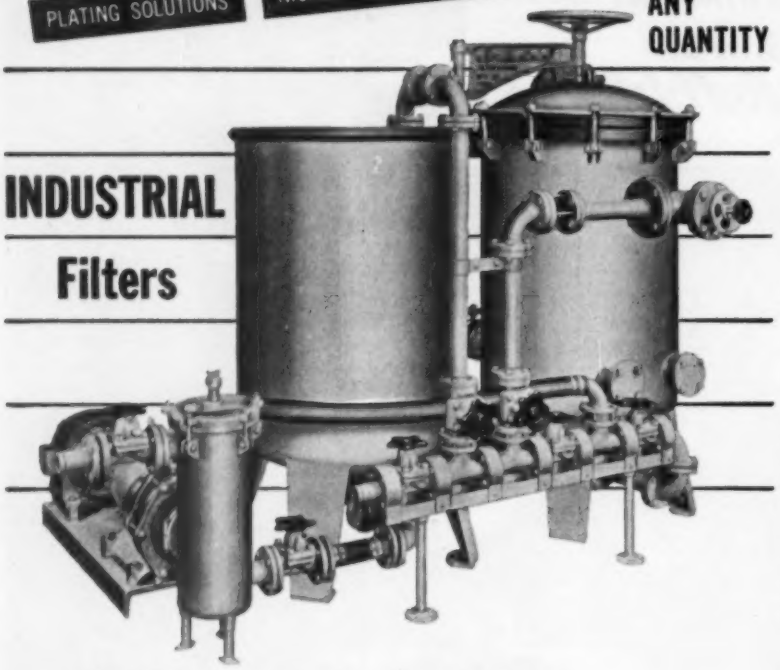

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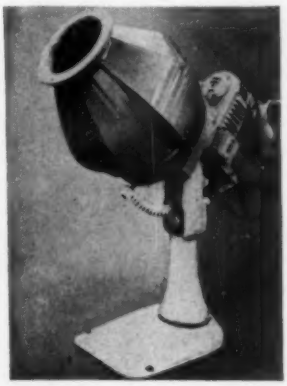
circuits, Mini-Breakers may also be applied at low cost as original circuit protective equipment on a wide range of electrically operated machines and appliances, according to the manufacturer. Descriptive literature and price information is available through use of Reader Service Card.

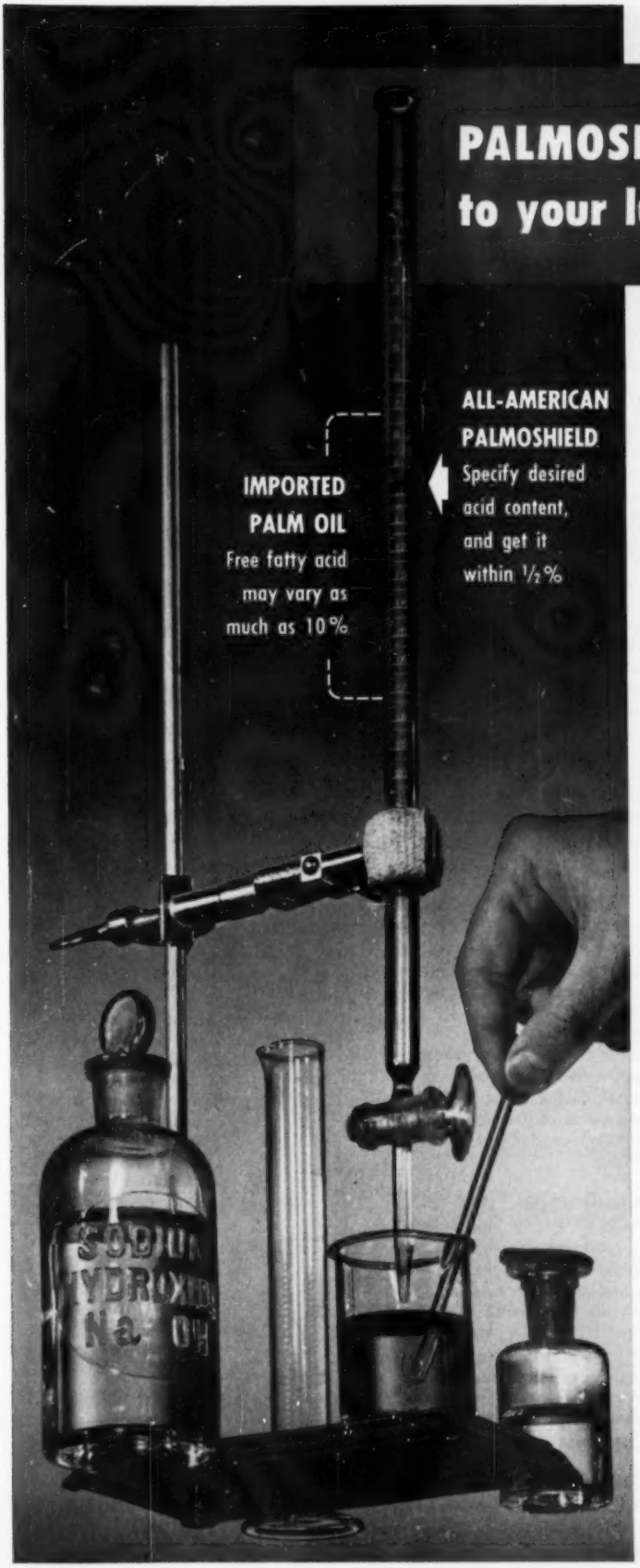
E—229. Flask Type Tumbling Barrel—A flask-type, direct motor drive, tilting tumbling barrel developed by the Hupp Corporation, Globe Division, Cleveland, Ohio, is said to be giving better work action for deburring and burnishing of all types of precision parts both ferrous and



non-ferrous. The newest addition to Globe's complete line of tumbling barrels is said to magnify the conventional tumbling action due to the restrictive nature of the flask-shaped design. The machine may be employed with all types of deburring and burnishing media and is available in sizes for loads ranging to 750 lbs. A 1/4 inch lining of abrasion resistant rubber or neoprene provides effective insulation to give longer life to the barrel shell while protecting parts against nicking and scratching. A free experimental metal finishing service offered by Hupp to improve quality or cut costs is available in connection with the new type barrel. Further details about the new flask-type tumbling barrel and experimental service may be obtained by using Reader Service Card.

E—230. New Cold Cleaners—Industrial metal cleaning can be streamlined into a low cost but highly efficient process with the aid of "cold cleaners" recently developed by the E. F. Houghton & Company, Philadelphia. Used at room temperature in power washers, the new Houghto-Clean 439 and 440 combination effectively removes such soil as heavy drawing oils, pigmented drawing compounds, sulfurized cutting oils, rust pre-

PALMOSHIELD is tailor-made to your lubricating needs



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For Palmoshield, the all-American replacement for palm oil, can be produced with the free fatty acid content you need within ½% (±½%). And, Palmoshield can be applied direct, in solution, or with proportioning pumps.

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Palmoshield looks, feels and acts like palm oil; requires absolutely no changes in mill operation. Yet it is a domestic lubricant made from freely available domestic materials. Users are not dependent upon overseas shipment from foreign controlled sources.

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During the past year production record after production record has been set by users of Palmoshield. In one company during a test run of 20 consecutive shifts production was stepped up 15%. Already nearly two-thirds of the major tin plate mills in this country and Canada are taking advantage of this tailor-made product.

Palmoshield is available for immediate shipment in 55 gallon drums and tank car lots. For full information, and for specialized research assistance, write The Ironsides Company, 270 W. Mound Street, Columbus, Ohio.

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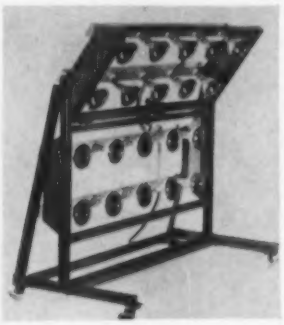
Equipment and Supplies

ventives, and polar type smuts from ferrous metals copper and brass. Other advantages proven in use are: long lasting stability which provides extra economy, protection against rust, simplicity of preparation and use. A descriptive 4-page leaflet completely describing Houghton's cold cleaners can be obtained by using Reader Service Card.

E—231. Infra Red Drying Equipment—A new type of infra-red drying equip-



ment has just been announced by the Trippe Manufacturing Company, Chicago 6, Ill. This dryer, known as the IR-20, is fully portable and uses 20 special 5000-hour life, infra-red bulbs. Both panels with their 20 lamps can be raised or lowered to floor level up to 76 inches, making the dryer extremely flexible. By means of a one-man control handle the upper panel of ten lamps can be tilted to any desired angle. The unit can be used on any 220 V, a.c., single phase line, and has a wattage demand of 3900. For further details use Reader Service Card.

E—232. Rust Inhibitor for Wet Blasting Machines—American Wheelabrator & Equipment Corporation, 1180 S. Byrkit St., Mishawaka, Ind., announces that Anarust, a liquid rust inhibitor for wet blasting machines, is available from stock. Anarust is an organic material, contains no chromates, and is completely soluble in hard or soft water at 20° C. It produces a clear, colorless and odorless solution, non-irritating to the skin and is not subject to bacterial decomposition. When used at the rate of approximately ½ oz/gal of water, it is very effective in retarding rusting on cast iron or steel parts which are being cleaned and washed after wet blasting. For additional details use Reader Service Card.

E—233. Protective Coatings—Flexcoat maintenance coating was developed to meet the needs of industry for a coating which would give protection against corrosion caused by atmospheric conditions, vapors, fumes, spillage and splash of chemicals which destroy expensive machinery and equipment. The material can be brushed, sprayed or dipped, can be applied over old paints, has good adhesion to metal, wood or concrete, and has a wide range of colors to decorate and identify machines and pipelines. Flexcoat is a complete system; primer and topcoat are absolutely homogeneous. There is no possibility of intercoat separation. Flexcoat industrial coating overcomes the difficulty experienced with most highly chemical resistant finishes—lack of adhesion. Manufactured by the Flexrock Company, Protective Coating Division, 3605G Filbert St., Philadelphia 4, Pa.—descriptive literature is available. Use Reader Service Card.

E—234. Nylon Fabric for Anode Bags and Diaphragms—The Hanson-Van Winkle-Munning Company, Matawan, N. J., announces a new specially-treated nylon fabric for anode bags and diaphragms. Known as NW Nylon, the new cloth increases the life and reduces the replacement cost of anode bags and diaphragms used to screen anode-sludge from the plating solution.

Laboratory and field tests indicate that the new fabric has greater resistance to chemical action and abrasion than cotton duck; has greater resistance to chemical action than other nylons; is particularly resistant to hot caustic solutions; and does not become salt incrusted.

Complete information on NW Nylon bags and diaphragms for given applications may be obtained by using Reader Service Card.

E—235. Electric Controller—A new electric contact controller for solenoid valves, warning signals and motors has just been announced by the H. O. Trerice Company, 1420 W. Lafayette Blvd., Detroit 16, Mich.

Vapor actuated, the controller is designed to stand a fairly heavy electrical load. A unique feature of the controller is a red and green pilot light to show at a glance the position of the switch. Complete information is available. Use Reader Service Card.

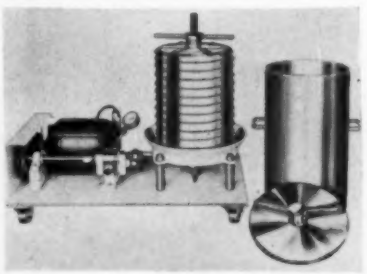
E—236. Closed Flame, Dual Fuel, Gas-Oil Burner—A new closed flame, dual fuel gas-oil burner, featuring increased burning efficiency and simplified installation and servicing, is announced by Eclipse Fuel Engineering Company, Rockford, Ill. This new sealed, blast burner may be used with any gas or oil fuel for firing industrial furnaces, ovens and process equipment in the operating range between 200° and 2400° F. For additional data use Reader Service Card.

E—237. New Electric Vapor Degreaser—Selling for approximately one-half the price of comparable units, the Wallace DG-1 Degreaser provides many exclusive features not previously available in the vapor-degreasing field.

It is a production unit, portable, electrically operated, insulated, thermostatically controlled, and ready for use in a fraction of the time ordinarily required.

Provided with either a 110 or 220 volt heating element, it is ready for instant plug-in operation. Heat-up time is less than 20 minutes, and the unit requires only 2½ gallons of solvent. The manufacturers non-inflammable Xsol solvent vaporizes, at a higher moisture-dispelling temperature, and this coupled with a hot-dip galvanized steel tank practically eliminates rusting and corrosion problems common with water-cooled units. For bulletins and prices write J. D. Wallace & Company, 133 S. California Ave., Dept. 1, Chicago 12, Ill., or use Reader Service Card.

E—238. ECF Down-Flow Filter—This Ertel Engineering Corporation filter is unique in its design in that it is a center feed unit. One of the important features of the filter is that the down flow filtration principle provides a means for building a stable uniform filter cake which will



not part from the screens as is the case of reverse-flow units. The amount of unfiltered material is kept to a bare minimum, being only that contained in the center feed pipe rather than within the entire cylinder. This is particularly important where expensive materials are being filtered. For additional data use Reader Service Card.

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Diversey No. 909 and No. 12 are two outstanding cleaners specially developed to provide superior finishes on steel surfaces through better, more thorough cleaning performance.

No. 909 and No. 12 are easily applied to a variety of different cleaning routines. No. 909 is a unique heavy duty soak tank cleaner. No. 12 is an electrocleaner for both direct and reverse current. The following case history is typical of the results you can expect through the application of Diversey No. 909 and No. 12.

Case History

Tubular Steel Furniture

PROBLEM: To clean polished steel tubular furniture prior to bright nickel and chromium electroplating.

FORMER PROCESS: Included mineral spirits soak, hand-wipe, spray wash, alkaline soak and two electrocleaning operations in which six men, working steadily, were employed in the hand wiping operation.

PRESENT PROCESS: Diversey No. 909 was substituted for mineral spirits and alkaline soaks and the hand wiping. Diversey No. 12 was used in the electrocleaners.

RESULTS: With Diversey No. 909 there is less smut and grease on the inside of the tubes than with former process thus avoiding contamination of pickle and plating tanks. The cleaner tanks now are dumped every two weeks rather than every week as was formerly necessary. The No. 909 and No. 12 are the only materials this leading finishing plant has found that would eliminate the solvent and hand-wipe operations. The elimination of the hand wiping labor costs results in an estimated savings of $15,000.00 per year. A definite increase in smoothness and luster of the electrodeposit has been obtained with Diversey No. 909.

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FEBRUARY, 1953 VOL. 40, NO. 2

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This month's cover photo shows the inspection of investment cast turbine and compressor blades for Westinghouse jet engines.

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when Harshaw first produced plating materials

Then again, perhaps you plated with Harshaw nickel as far back as the year 1898 . . . when we started producing for the plating industry.

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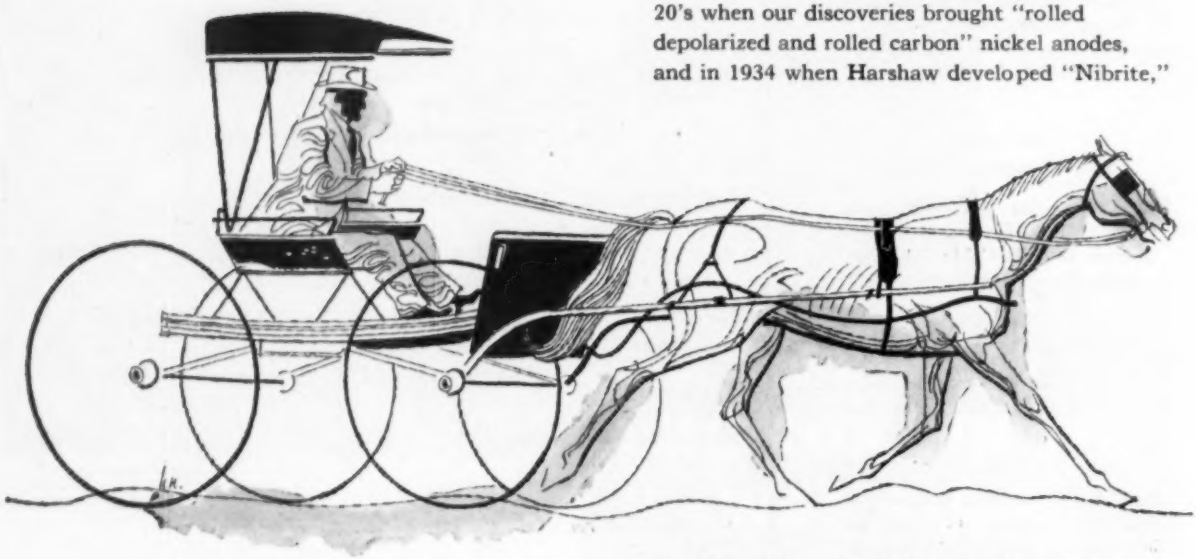

the first *bright* nickel. Harshaw installed the first commercial bright electroplating bath in 1935. That was a famous first, as you will recall. Of equal importance, too, were our introductions of fine crystal single nickel salts, and Perflow, the first truly leveling nickel deposit.

If you're a youngster, well then you should know more about us, and for that reason we have prepared a 16-page booklet which tells all about us—how thoroughly we serve the plating industry, and other major industries such as ceramic, petroleum, metalworking, paint, and others as well. Write for this free booklet. We'll be happy to send it.

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Editorial

Application for Admission to the
American Electroplaters' Society

Your Ticket To Self-Improvement

HAVE YOU PASSED OUT an application blank recently? Perhaps you—as a member of the Society—have never thought to ask your electroplater friend to join. If you have not, stop and think of the value it may mean to you and your industry in obtaining another member.

If each of us obtains one new member during this year, our membership will exceed TEN THOUSAND. This is not an artificial goal for an industry which counts the gross value of its Products in excess of half a billion dollars.

Increased membership will bring us a stronger society which can speak more accurately and authoritatively for the electroplater. Increased membership lowers the unit cost—for, the larger the organization, the lower the per capita overhead, so that increased professional and technical service can be rendered without increased dues.

The Society can best grow by the united support of its membership. The officers of your Society are most anxious for the A. E. S. to enjoy a steady, healthy growth.

CAN WE COUNT ON YOU IN 1953?

Ralph A. Schaefer

The following paper is a result of the work sponsored at Lehigh University by the A. E. S. and the Ohio River Valley Water Sanitation Commission. While the original cadmium procedure was worked out under A. E. S. sponsorship, the modification was developed under ORVWSC sponsorship, the commission having sponsored the project at Lehigh so as to be able to utilize the background developed by the A. E. S. projects.

COLORIMETRIC DETERMINATION OF CADMIUM IN EFFLUENTS*

E. J. SERFASS†, R. F. MURACA‡ AND D. G. GARDNER§

ABSTRACT

A colorimetric procedure for the determination of the cadmium content of effluents in the range of 5 to 50 ppm is presented. The method was found to give satisfactory results in the presence of 500 to 5,000 ppm of each of 27 ions in simultaneous admixture.

The method is a mono-color procedure employing dithizone as the color forming reagent. Silver, mercury, and copper, which interfere, are extracted with dithizone at a low *p*H where cadmium does not complex with dithizone. The solution is made slightly alkaline, and interference from nickel and cobalt is eliminated by complexing with dimethylglyoxime. The solution is then made strongly alkaline and the cadmium is removed as the red dithizone complex, which is measured with a colorimeter.

The procedure can be materially shortened if the concentrations of silver, mercury, copper, nickel and cobalt are below 0.5 ppm. A list summarizes the changes that can be made when the amounts of the materials other than cadmium are known or can be estimated.

A modified procedure for the analysis of water samples where the concentration of cadmium is as low as 0.01 ppm is also included in the report.

The colorimetric determination of trace quantities of cadmium is most conveniently carried out by the use of diphenylthiocarbazone (dithizone) in strongly basic media. Numerous investigators have modified the original Fischer-Leopoldi[1] scheme employing dithizone to allow for the analysis of cadmium in the presence of a wide range of impurities such as in plating baths[2], biological matter[3], and minerals[4].

The method described is based on the fact that very few elements interfere in the extraction of cadmium from strongly basic media, and those that do (silver, mercury, copper, nickel, and cobalt) can easily be removed by a preliminary extraction with dithizone and dimethylglyoxime.

The method presented is a modification of the mono-color method of Shirley, Benne, and Miller[5].

Description of the Method

A preliminary fuming with nitric and sulfuric acids is carried out to decompose organic material that may retain cadmium in a form which will not react with dithizone. Hydrochloric acid is added to the slightly diluted digestion mixture after the fuming operation to precipitate the larger portion of the silver that is present. Insoluble substances are then removed by filtration or centrifugation.

The solution is adjusted to a *p*H of 2 and extracted with a strong solution of dithizone in chloroform. Copper, mercury, and the remainder of the silver are removed by this extraction. At such a low *p*H, cadmium is not extracted.

The solution is next adjusted to a *p*H of 8.5–9.0 and dimethylglyoxime is added. On extraction of the solution with chloroform, nickel is removed. The cobalt-dimethylglyoxime complex, which is not extracted by chloroform, has been found to be unreactive with dithizone.

The solution is then made strongly basic with sodium hydroxide and the cadmium is extracted with dithizone in carbon tetrachloride. Zinc is also extracted with cadmium at this high *p*H, and if the zinc is present in large excess (greater than 500:1), it is difficult to extract the last traces of cadmium and low

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results will be obtained. The small amount of zinc that does come over with cadmium in the dithizone extraction is removed by washing the solvent layer with a 2 per cent solution of sodium hydroxide.

The intensity of the red cadmium-dithizone complex is measured at 515 millimicrons wave length in a spectrophotometer or in a colorimeter equipped with a suitable filter.

The recommended procedure was found to give excellent results for concentrations of cadmium in the range of 5 to 50 ppm in solutions containing in simultaneous admixture 500 ppm each of Cu^{++}, Co^{++}, Zn^{++}, and 5,000 ppm each of the following ions: Ag^{+}, Hg^{++}, Pb^{++}, Bi^{+++}, As^{+++}, Sb^{+++}, Sn^{++}, Cr^{+++}, Al^{+++}, Fe^{+++}, Mn^{++}, Ni^{++}, Ca^{++}, Sr^{++}, Ba^{++}, Mg^{++}, Na^{+}, K^{+}, NH_4^{+}, CN^{-}, CNS^{-}, PO_4^{---}, SO_3^{--}, $S_2O_3^{--}$, and organic materials such as tartrates and acetates.

Sensitivity of the Method

The sensitivity of the method is defined as the smallest number of micrograms of cadmium ion that must be contained in the 5 ml sample taken for analysis in order that this quantity can be determined with a relative error of ±50 per cent. It has been ascertained that the recommended procedure is capable of a sensitivity of 25 micrograms (5 ppm).

Limit of Detection of the Method

The limit of detection of the method is defined as the minimum number of micrograms of cadmium that must be present in the 5 ml sample taken for analysis so that an extinction of about 0.005 will be obtained in step 13 for a 1 cm cell thickness at 515 millimicrons wave length. For the recommended procedure, the limit of detection is 2 micrograms of cadmium ion (0.4 ppm).

Discussion of the Blank

A blank must be run along with the sample to compensate for impurities in the reagents.

Recommended Procedure

This procedure is designed to be used for the determination of 5 to 50 ppm of cadmium in a 5 ml sample of effluent.

Reagents Required

1. *Nitric acid:* Concentrated, 16 N; reagent grade
2. *Sulfuric acid:* Concentrated, 36 N; reagent grade
3. *Hydrochloric acid:* Concentrated, 12 N; reagent grade
4. *Chloroform:* Reagent grade; preferably distilled over CaO before use.
5. *Carbon tetrachloride:* Reagent grade, redistilled over calcium oxide prior to use
6. *Ammonium hydroxide*, concentrated: Pass ammonia gas from a cylinder into distilled water kept cold by immersion in an ice bath. Store in a plastic container*.
7. *Sodium potassium tartrate solution:* 20 per cent w/v. This solution is purified by extraction with 0.01 per cent dithizone in carbon tetrachloride. The dithizone and yellow oxidation product of dithizone are removed by extraction with successive portions of chloroform until the latter extracts remain colorless. The solution is then extracted with carbon tetrachloride to remove any chloroform. Store in a plastic container.
8. *Dimethylglyoxime solution:* 1 per cent w/v. in alcohol.
9. *Dithizone, 0.01 per cent in carbon tetrachloride:* Since even reagent grade dithizone may be contaminated to some degree by the oxidation product of dithizone (diphenylthiocarbodiazone), the following procedure is strongly recommended for preparing the dithizone solution.

   Dissolve 100 mg of pure dithizone in 50 ml of chloroform. Filter the solution through paper into a separatory funnel. Extract with three 50 ml portions of 1 per cent ammonium hydroxide. Discard the chloroform and extract the ammoniacal solution with three 10 ml portions of carbon tetrachloride. Reject the carbon tetrachloride extracts. Precipitate the dithizone in the ammoniacal solution with 2 ml of concentrated HCl. Extract the solution with carbon tetrachloride until the aqueous layer becomes colorless, or almost so. Combine the extracts and dilute to one liter with CCl_4.
10. *Dithizone, 0.1 per cent in chloroform.*
11. *Sodium hydroxide solution:* 10 per cent w/v. Store in a plastic container.
12. *Sodium hydroxide solution:* 2 per cent w/v. Store in a plastic container.
13. *Standard cadmium solution:* Dissolve 100 mg of pure cadmium metal in 20 ml of distilled water containing 5 ml of concentrated HCl. Dilute this solution to one liter with distilled water. Store in a plastic container. Pipette 25 ml of this solution into a 100 ml volumetric flask, add 1 ml of concentrated HCl, and dilute to the mark with distilled water. The latter solution, which is the *Standard Cadmium Solution*, should be stored in a plastic container.

   1 ml = 25 micrograms of cadmium

   For establishing a calibration curve, 1 ml of this solution taken as a sample corresponds to 5 ppm of cadmium for a 5 ml sample of effluent taken for analysis in step one of the recommended procedure.

Recommended Procedure for Determination of Cadmium

1. Pipette a 5 ml sample of the effluent into a 125 ml Erlenmeyer flask.

*The plastic containers recommended are polyethylene bottles readily available from chemical supply houses.

In running a blank, use 5 ml of distilled water.

In establishing a calibration curve, use 5 ml of distilled water and add 1 ml of the standard cadmium solution for each 5 ppm of cadmium.

2. Add 5 ml of concentrated nitric acid and 1 ml of concentrated sulfuric acid and evaporate to strong fumes of SO_3. Hold at this temperature and allow SO_3 to evolve for 5 minutes.

   If the residue after fuming is discolored by organic carbon, cautiously add 2 ml of concentrated nitric acid and fume again. Repeat as many times as is necessary. Additional concentrated sulfuric acid may be needed to prevent the mixture from going to dryness.

3. Cool the solution and dilute with about 25 ml of water.

   Add 0.5 ml of concentrated hydrochloric acid.

4. Filter the solution, if necessary, through a medium porosity sintered glass funnel, saving the filtrate.

   Wash the filter at least three times with 5 ml portions of water. Combine the filtrate and washings.

5. Transfer the filtrate and washings to a 100 ml volumetric flask and dilute to the mark with water.

6. Pipette a 10 ml aliquot from the above solution into a 150 ml beaker.

   Add 5 ml of 20 per cent sodium potassium tartrate solution.

   Adjust to a *p*H of 2.0 with concentrated HCl or NH_4OH.

7. Transfer the solution to a separatory funnel.

   Extract with 5 ml portions of 0.1 per cent dithizone in $CHCl_3$ until the dithizone layer remains green. Reject the extracts.

   Wash with 10 ml portions of $CHCl_3$ until the chloroform layer remains colorless. Reject the washings.

   Wash with one 5 ml portion of CCl_4 and reject the washing.

8. Transfer the water solution from the separatory funnel to a 150 ml beaker.

   Add 5 ml of 20 per cent sodium potassium tartrate solution.

   Adjust to a *p*H of 8.5–9.0 with concentrated ammonium hydroxide or HCl.

   Transfer the solution to a separatory funnel.

   Add 5 ml of 1 per cent dimethylglyoxime solution and shake vigorously for 30 seconds.

   Extract with three 10 ml portions of $CHCl_3$ or until any white precipitate resulting from excess dimethylglyoxime has been removed. Reject the extract.

   Wash the solution once with a 5 ml portion of CCl_4 and reject the washing.

9. Add 10 ml of 10 per cent NaOH solution. Extract the water solution in the separatory funnel with 5 ml of 0.01 per cent solution of dithizone in carbon tetrachloride.

   Transfer the CCl_4 layer to a clean separatory funnel.

   Extract the water solution in the first separatory funnel with another 5 ml portion of 0.01 per cent dithizone in CCl_4. Combine the extracts.

   Continue to extract the aqueous layer with 3 ml portions of dithizone until the extracts remain colorless or slightly yellow showing that all the cadmium has been removed.

10. Wash the combined dithizone extracts with two 20 ml portions of 2 per cent NaOH solution. Reject the washings.

    Wash the combined dithizone extracts with one 20 ml portion of distilled water. Reject this washing.

11. Filter the red solution of cadmium-dithizonate complex in the separatory funnel through a small filter paper into a 25 ml volumetric flask. Wash the filter paper with a little carbon tetrachloride and add this washing to the contents of the flask.

    Dilute to the mark with CCl_4 and shake.

12. Set the Klett-Summerson colorimeter to zero with carbon tetrachloride. Use a green (No. 54) filter. With a spectrophotometer, set the instrument to read 100 per cent transmission at 515 millimicrons.

13. Transfer the solution from step 11 to the sample cuvette and read the colorimeter within 15 minutes.

14. If necessary, convert the scale readings of the photometer to extinction. Subtract the blank reading from the sample reading. If a calibration curve is being established, plot these corrected readings versus ppm of cadmium. If a sample is being run, read the amount of cadmium from the calibration curve.

Variations of the Recommended Procedure

If the composition of the effluent is known, the recommended procedure for cadmium can be materially shortened.

The following summarizes the changes that can be made in the recommended procedure for cadmium when the composition of the sample is known. Unless otherwise stated, the concentrations of Cu^{++}, Co^{++} and Zn^{++} should not exceed 500 ppm, and the concentrations of other elements should not exceed 5,000 ppm. For effluents containing greater quantities of these elements, dilution will be necessary. The effluents should be adjusted to a *p*H between 2 and 9.

When organic matter is absent in the composition of the effluent, changes in the recommended procedure for the determination of cadmium are: omit steps 1 to 5 inclusive. Pipette 5 ml of the sample into a 150 ml

(*Continued on page 154*)

A THEORY OF HYDROGEN OVERVOLTAGE AND ITS RELATION TO THE ELECTRODEPOSITION OF METALS*

GEORGE DUBPERNELL† and ROBERTA DUBPERNELL‡

(*Continued from the January 1953 Issue.*)

Discussion

While the Haring Cell has been widely used for about twenty-five years, it seems to have been employed entirely in studies of metal deposition, especially copper, nickel, and silver. Ferguson[24] describes a special Haring Cell arrangement for studies of polarization both with and without metal deposition, but the authors are not familiar with any published reports on polarization or hydrogen overvoltage alone.

Stareck and Taft[25] give results on plain KCN solution between platinum electrodes, but do not deduct the IR drop measured in the center compartment, and do not report the IR drop measurements. Using Ag CN and KCN they observed a black silver deposit at the cathode at high current densities, which was most stable in alkaline solutions, and which evolved hydrogen gas and turned white upon decomposition. They assumed this to be a silver hydride containing negative hydrogen, and noted that it had strong reducing properties. On the basis of the views in this paper, this black deposit would more simply be regarded as an electronegative metal alloy of silver, and this would explain its reducing properties without the need to assume the existence of negative hydrogen or "nascent hydrogen".

The term "nascent hydrogen" has been used frequently for over one hundred years to describe reactions not attributable to hydrogen as it is ordinarily known, and yet there does not seem to be closer approach to an understanding of the matter than formerly. The use of the term was questioned by Reed[26] and others, and a review is given in Gmelin[27]. Many workers refer also to such things as "atomic hydrogen", "overvoltage compounds", "overvoltage hydrides", "active material", and so on, without justifying their use of these terms.

The presence of "atomic hydrogen" at the cathode was first suggested as a pure speculation by Ostwald[28], who also suggested the rate of combination of the atoms as a possible mechanism for the explanation of overvoltage. This type of explanation has been taken up by many more recent workers with enthusiasm, even though it was not mentioned in a later paper by Ostwald on "Electrolysis and Catalysis"[29], and the concept of the secondary formation of hydrogen at the cathode after primary deposition of an electronegative metal, was expounded at some length.

The properties of atomic hydrogen are well reviewed by Glockler and Lind[30], and in Gmelin[27]. Langmuir studied it in some detail[31, 32], but stated that he felt that it was a mistake to try to account for overvoltage by means of infinitesimal concentrations of atomic hydrogen[33], and again that slowness of progress in studies of overvoltage and passivity ". . . has probably been largely caused by an undue emphasis on what may be called the thermo-dynamic viewpoint in electrochemistry"[34]. He established[32] that atomic hydrogen is only stable in appreciable quantities at temperatures in the range of 2,000° C to 3,000° C or above. It may be stable for a short time at room temperature in a high vacuum in glass tubes, but recombines instantly to form molecular hydrogen in the presence of any oxygen or water. It has some reducing power, but nothing comparable to cathodic reduction, or that of metallic sodium.

Another reason for assuming the existence of atomic hydrogen at cathodes is the diffusion of hydrogen sometimes noted through thin metal foils, and the high pressures sometimes built up inside of sealed metal tubes treated cathodically, or inside of crevices in metal so as to cause blistering. Ferguson and Dubpernell have shown[35,36] that hydrogen does not diffuse through even very thin foils of platinum or palladium, and that the phenomena are due to porosity of the

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metal, and capillary and surface conductivity effects. These views have not yet received very wide acceptance, but make any assumption of the existence of atomic hydrogen at room temperature unnecessary.

A recent paper by Fischer and Heiling[37] is accepted as demonstrating the diffusion of atomic hydrogen or cathode polarization from the outside into the inside of a thin, annealed carbonyl iron beaker in N H_2SO_4. However neither the thickness nor the exact method of production of the iron beakers used is given, and apparently they were not tested for porosity. There was probably a direct solution connection between the outside and the inside, since the cathode polarization would increase on the inside as much as 0.3 volt or more in a few seconds following an increase on the outside. Likewise, every detail of polarization on the outside was reproduced on the inside, but with lower values.

The controversy which followed Le Blanc[4] and Ostwald's[5,6] suggestion of the primary rather than secondary formation of hydrogen at the cathode, is reviewed in some detail by Sack[18]. Arrhenius[38] reported the results of numerous experiments in which he found a substantial time required to get hydrogen evolution on mercury cathodes from neutral salt solutions, and which he explained as due to the primary deposition of the alkali metal before hydrogen evolution occurred. Le Blanc[39] replied at some length, and felt that hydrogen evolution occurred immediately and directly, but went unobserved for one reason or another.

Nernst also investigated the matter, and reached the conclusion that while primary hydrogen evolution is possible, in practice it is mostly secondary[40]. A student of Nernst's, Glaser, published a more detailed study in which it was concluded that while theoretically hydrogen may deposit primarily, in actuality, at moderate current densities it is mainly formed secondarily[41].

Bancroft first favored the primary deposition of sodium and secondary formation of hydrogen[42]. In discussing this 1905 paper, C. J. Reed favored the direct deposition of the "more easily reducible" hydrogen, while J. W. Richards emphasized that sodium deposits primarily on mercury, with no hydrogen evolution. In 1916[43] and 1920[44] Bancroft favored the assumption of the existence of atomic hydrogen at the cathode to explain overvoltage, but in 1929 emphasized the direct deposition of sodium, and the possibility of reproducing any cathode reaction chemically with sodium[45].

Fichter and co-workers appear to have followed the suggestion of Bancroft, in connection with organic reductions. On page eight of his book, Fichter[46] refers to a number of his publications and states that it has been shown in numerous examples that an alloy of pure lead and sodium gives exactly the same reduction effect as a lead cathode in acid solution. Similarly, Parker and Swann[47] found that reduction of sugars in acid solutions at zinc and lead cathodes only took place if an alkaline film could be maintained at the cathode surface, and that, if the catholyte was free of sodium ions, no reduction was obtained with an acid concentration above 0.1N.

Many phenomena become more understandable in the light of the theory of cathode polarization here presented. The change in surface tension of the mercury in the Lippman capillary electrometer is probably partially associated with the deposition of a minute amount of sodium, as pointed out by Freundlich[48]. Edison[49] discovered in 1874 in connection with the development of telephone and telegraph equipment that friction was decreased on a cathodically polarized metal surface and increased on the anode. The phenomenon was studied by a number of workers including Arons[50], but no satisfactory explanation was found. The effect might be due to a lubricating action of caustic soda formed at the cathode, on the surface alloyed with alkali metal. The "electrical lubrication" of equipment for handling clay by making the surfaces cathodic[51] might involve a similar explanation, although this lubricating effect is usually ascribed to the production of a layer of water at the cathode by electroendosmosis.

In polarography[52], using the dropping mercury electrode, the "limiting current" or "diffusion current" which gives the concentration of the substance being determined, is stabilized and made more reproducible by working in the presence of an "indifferent salt" or "supporting electrolyte", generally 0.1N KCl. This eliminates what is called the "migration current" and leaves the diffusion current as a more measurable quantity. It also tends to eliminate "hydrogen waves" and has other desirable effects. When the alkali or alkaline earth metals are being determined, a different supporting electrolyte is used such as tetramethylammonium hydroxide. The observations in this field should be more consistently understandable on the basis of the concept of hydrogen overvoltage proposed in the present paper.

Potentials frequently seem to involve adsorbed or otherwise held sodium or other alkali metal ions. The glass electrode is a sodium electrode to a considerable extent according to Dole[22]. MacGillavry, et al[53] found little effect in acid solution, but substantial negative potentials on nickel immersed in alkaline solutions.

The salt effect in connection with hydrogen overvoltage was investigated by dé Bethune[54], who observed many irregularities using a mercury cathode with various concentrations of hydrochloric acid and potassium chloride. When the concentration of acid was low and that of potassium chloride high, he obtained potassium deposition with 100 per cent current efficiency and overvoltages around 1.7 volts or higher. By working carefully at low current densities, and with more acid and less salt, he considered that the mercury cathode functions as a hydrogen electrode, and measured overvoltages up to about 1.2 volts. It is felt that it is much more reasonable to regard the cathode potentials as due entirely to potassium rather than hydrogen, and then proceed to ascertain if any of the polarization at low current densities may be

ascribed to hydrogen or not. The slight increase in overvoltage observed in the more dilute solutions of acid is probably due to the relatively greater effect of alkali dissolved from the glass, and future work should include the avoidance of glass apparatus.

The importance of avoiding the use of glass in some electrochemical experiments appears to be generally overlooked. Much of modern electrochemistry could be said to be the electrochemistry of glass containers. Lavoisier showed in 1770 that water only left a residue if evaporated in glass containers, and that if the water was distilled and evaporated in metal vessels it was pure and evaporated with no residue[55,56].

Sir Humphry Davy[57] showed by using gold containers that no alkali is formed at the cathode when electrolyzing water, and that the alkali is ordinarily due to the glass containers used. By working in a hydrogen atmosphere with the gold containers he was able to show that pure water is decomposed into hydrogen and oxygen alone, and no alkalinity is formed at the cathode, or acidity in the anode compartment. It would seem essential for modern electrochemists to be familiar with Davy's work, and to repeat and extend his experiments.

Relation to the Electrodeposition of Metals and the Structure of Deposits

The electrodeposition of metals from complex salts such as cyanides is sometimes considered to involve the primary deposition of the alkali metal and secondary formation of the heavy metal coating. Hedges[58] showed that the electrodeposition of metals from cyanide solutions takes place through a secondary reaction, with periodic hydrogen evolution when the cathode becomes more saturated with codeposited alkali metal. Mercury would not deposit from 0.1N mercuric chloride until 0.1N potassium chloride was added. Periodic codeposition was also observed with mercury and sodium, barium, strontium, calcium, and aluminum. Tin deposition from caustic soda solution gave poor, slow periods lasting 15 minutes. This is of the same order of magnitude as the periods of 20 minutes which Snavely[59] calculated to correspond to the laminations in certain chromium deposits.

Fink[60] suggested that the primary deposition of sodium and secondary deposition of metals gave fine grained deposits. In the discussion which followed, W. Blum and A. L. Ferguson protested that no sodium deposition was possible under usual conditions, without, however, considering the possibility of depolarization by the metal of the cathode (alloy formation). The ease of depositing sodium on mercury at low potentials was emphasized by Evans[61], in connection with the explanation of tungsten deposition from aqueous solutions by the formation of an alloy. In the same discussion[62], the senior author suggested that periodic gassing in many plating processes, as in bright cadmium plating, is caused by the charging of the deposit with an alkali metal, giving increased polarization, until finally hydrogen is evolved. The agitation due to the hydrogen evolution brings up fresh solution, decreases the polarization, and the cycle sets in all over again.

It is suggested that something like this is involved in the formation of banded, laminated, striated, or layered deposits frequently observed, especially in connection with the production of bright plates. Thus Meyer[63] and Meyer and Phillips[64] found that bright cyanide copper deposits produced by alloying with a small amount of lead or cadmium had a laminated or banded structure when examined in cross section. They also determined that periodic fluctuations of cathode polarization occurred which corresponded to the thickness of the bands in the deposits. They reviewed a number of previous observations of banded or striated deposits of iron, cobalt, nickel, and copper.

It seems noteworthy that cadmium and lead are also brighteners for nickel baths, and are in addition the highest cathodic overvoltage metals, aside from mercury. It is not meant to suggest that bright copper or nickel deposits containing cadmium or lead also contain noteworthy amounts of alkali or other electronegative metals. These electronegative metals probably participate in the formation of the deposits and determine the cathode polarization and *p*H of the cathode film, without, however, remaining in the deposit in appreciable quantities. Nevertheless, the reducing power and ability to later give off hydrogen sometimes noted in freshly made deposits, is probably an indication of the presence of some residual alkali metal. The banded structure observed may be due to varying grain size, or varying quantities of inclusions associated with varying *p*H of the cathode film.

Many studies of the banded structure of nickel deposits have been published[65,66,67,68] but the cause of the phenomenon does not seem to be understood. A current paper gives an excellent review[69]. In his paper on the mechanism of bright plating, Henricks[70] discussed periodic deposition at some length. The present paper merely adds to all this the fact that the periodic deposition of an alkali or similar metal is probably also involved, and in fact is probably a controlling factor.

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Cadmium in Effluents

(*Continued from page 150*)

beaker, add 0.5 ml of concentrated HCl, filter if necessary, transfer to a 100 ml volumetric flask, and dilute to the mark. Proceed with step 6 of recommended procedure.

With organic matter absent and silver, mercury and copper each below 0.5 ppm omit, steps 1–7 inclusive. Pipette a 5 ml sample of the effluent into a 100 ml volumetric flask and dilute to the mark with water. Pipette a 10 ml aliquot from this solution and start with step 8 of the recommended procedure, but add 10 ml of 20 per cent sodium potassium tartrate solution instead of the 5 ml required in this step.

When organic matter is absent and nickel and cobalt each are below 0.5 ppm in the composition of the effluent, omit steps 1 to 5 inclusive. Pipette a 5 ml sample of the effluent into a 150 ml beaker, add 0.5 ml of concentrated HCl, filter if necessary, transfer to a 100 ml volumetric flask and, dilute to the mark. Start with step 6 of the recommended procedure and omit step 8 in following through the scheme. In step 9, add 5 ml of 20 per cent sodium potassium tartrate solution before adding the 10 ml of 10 per cent NaOH solution.

With organic matter absent and silver, mercury, copper, nickel and cobalt each below 0.5 ppm, omit steps 1 to 8 inclusive. Pipette a 5 ml sample of the effluent into a 100 ml volumetric flask and dilute to the mark. Pipette a 10 ml aliquot of this solution into a separatory funnel, add 10 ml of 10 per cent sodium potassium tartrate, solution, and proceed with step 9 in the recommended procedure.

With organic matter present and copper, cobalt, and zinc each below 500 ppm, and all other elements below 5,000 ppm each, follow the recommended procedure.

A Shortened Procedure for Cadmium in the Range 0.01 to 5 ppm

The following prodedure is designed for the analysis of water samples when the concentration of each of the heavy metals including cadmium is very low and the only elements of appreciable concentration are the alkali metals and alkaline earths. The effluent should be nearly neutral (between *p*H 2 and 9).

When the composition of the effluent is such that cadmium is in the range 0.01 to 0.1 ppm, alkali and alkaline earth metals below 10 ppm, all other elements below 2 ppm, silver, mercury, copper, nickel, cobalt and organic matter absent, the shortened procedure is: Pipette a 100 ml sample of effluent into a separatory funnel, add 1 ml of 20 per cent sodium potassium tartrate solution, and 15 ml of 10 per cent NaOH solution. Extract with 5 ml of 0.01 per cent solution of dithizone in CCl_4. Transfer the extract to another separatory funnel. Continue to extract with small portions of dithizone until the extracts are colorless or slightly yellow. Wash the combined extracts with two 20 ml portions of 2 per cent NaOH followed by one 20 ml portion of distilled water. Reject the washings. Transfer the cadmium dithizonate to a 25 ml volumetric flask, dilute to the mark with CCl_4, and read on a colorimeter with a green filter.

When cadmium is in the range 0.1 to 1 ppm and all other materials are at the concentrations listed above, the shortened procedure is the same as the above except that a 10 ml aliquot of the 100 ml sample is used.

With cadmium in the range 1 to 5 ppm, and all other materials at the concentrations listed above, take a 10 ml sample and use a 1 ml aliquot and proceed as before.

NOTE: For effluents containing cobalt, nickel, copper, mercury and silver and where it is desired to analyze for cadmium between 0.01-5 ppm, use the above sample sizes and proceed by the recommended procedure.

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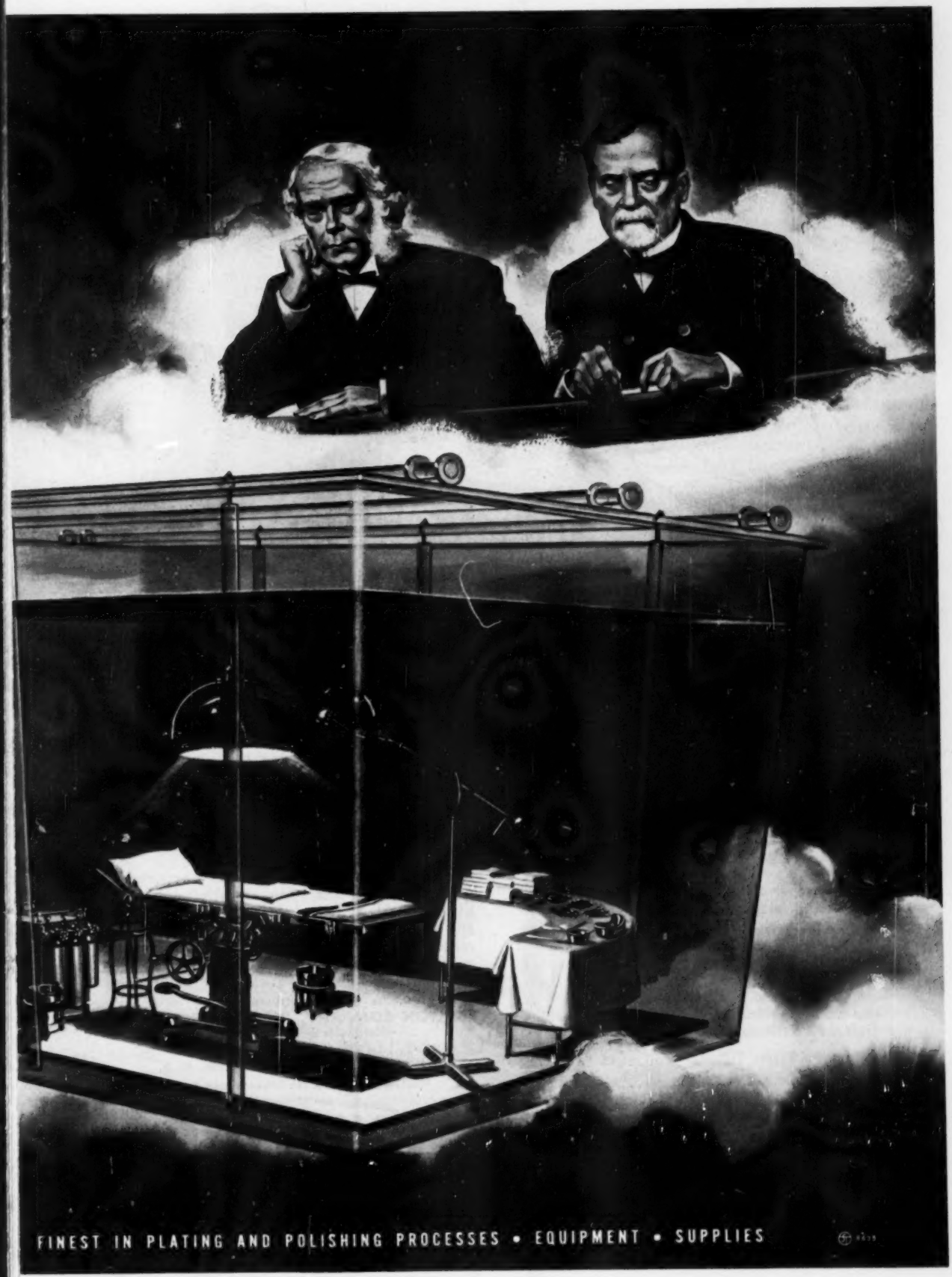
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(*Continued from page 154*)

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Book Review

DR. HAROLD J. READ

Professor of Metallurgy, Pennsylvania State College

HANDBOOK OF ENGINEERING FUNDAMENTALS edited by Ovid W. Eshbach, 2nd edition, 1952, x + 1314 pages. John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. Price, $10.00.

Although there is no doubt that this well-edited handbook has been written with great care by a corps of qualified experts in special fields and contains a great deal of condensed information, it is necessary in this review to examine its usefulness from the standpoint of the metal finisher. Perhaps this can best be done by first reviewing briefly the contents of the volume. With but few exceptions the fourteen sections of the book are descriptive in nature, although a certain amount of graphical and tabular data is included.

The first three sections are devoted to the principles of mathematics and tables of useful physical, mathematical and engineering data. They are unusually well done and are very complete. The second group of five sections deals with typical engineering subjects, including the mathematics of rigid and deformable bodies as well as incompressible fluids. A section on aerodynamics will be of little use to the metal finisher but another on engineering thermodynamics is a succinct presentation of this subject. Three sections on fundamental physics and chemistry are comparatively brief, particularly with respect to chemistry and may not prove very useful to those whose basic training is in chemistry or chemical engineering. Two sections on the properties of metallic and nonmetallic materials should prove extremely useful to those who are faced with problems of design and materials of construction. A great deal of valuable information is presented in a very readable form. The final section on engineering law is clear and easy to read and might well prove of value to those who have to deal with fiscal matters.

To a large degree Eshbach's handbook supplements the information commonly provided in handbooks for chemical engineers and chemists, although there is a considerable amount of duplication. The duplication occurs, however, in those sections of either type of handbook where the treatment is least complete. One could say, therefore, that although the metal finisher might find more use for a chemical engineering handbook, an additional investment in Eshbach's handbook may well be worth while if he is dealing with the engineering aspects of his profession.

The usefulness of the book is enhanced by a very complete subject index. The volume is nicely printed and bound, and its size is such that it can be easily handled, a virtue not possessed by some other handbooks.

LIGH

for

FINISHING

These two views were taken in the plant of an instrument manufacturer. Because operations involve handling of polished metal, quality illumination is especially valuable. The machine room area is 20 by 60 feet with an 8½ foot ceiling. Four continuous rows of fluorescent fixtures are used to provide 60 footcandles. The units are louvered and designed to direct a portion of the light to the white ceiling. Louvered shielding softens the effect of direct lighting and minimizes annoying reflected glare from metal surfaces. The upward component of the illumination prevents sharp contrasts of light and dark areas on the ceiling and adds a further diffuse effect to the balanced quality of the general illumination

The overall effect of light in the high bay area emphasizes the part played by the upward component. Three rows of fluorescent louvered units are used. About 45 footcandles average is delivered on the work

The several illustrations presented on these pages offer practical examples of the importance of lighting to metal finishing plants in their daily operations.

The views of general lighting for high and low bay areas provide a basic reference for all industry. Most of the nation's manufacturing plants are dependent upon lighting, vitally to some degree, for all or part of their production processes. By and large, this need begins with a range of seeing tasks and the individual eyesight of a group of workers doing related jobs. A general level of illumination is sought which will take care of individual eyesight demands for the various ranges of tasks. To the extent this basic overhead lighting is well planned and maintained, a key factor for efficiency and safety is adequately provided. The wisdom of having general lighting of this character would seem to be self evident. Nevertheless, it is the exceptional plant that has such lighting and regularly maintains it.

Specialized seeing tasks are represented by the several examples of work that must be inspected visually. As the examples indicate in the caption descriptions the light needed for these tasks is usually at levels much higher than for general lighting. Besides the extra quantity required, the task may demand that the lighting be directional or diffuse or of a particular spectral quality, such as the black light inspection technique.

Radiant energy has also been used for several years in one aspect of metal finishing which involves no seeing. Infrared drying, now widely established, has greatly reduced the time needed for finishing painted

TING

the

INDUSTRY

metal surfaces. It takes a certain amount of lamps to do a specific drying job. No manufacturer using this process neglects to use the number needed. Not if he wants the full benefit of the process. All lighting problems deserve such consideration.

Another lighting application is represented by an example of a type of lamp useful for indicator service such as in circuits controlling generators, exhaust blowers and the like.

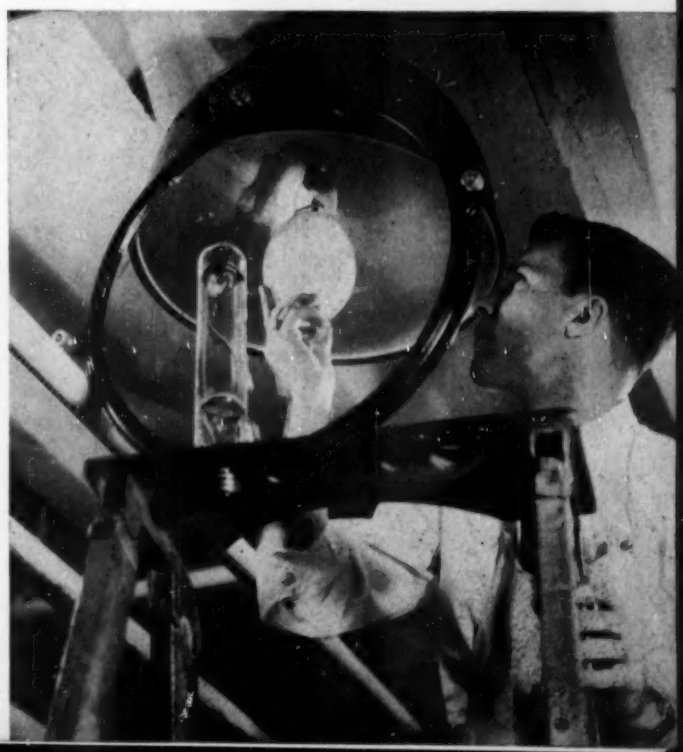
Also represented is the field of applications for ultra-violet type of lighting which is now finding a wider use industrially. Germicidal, ozone producing and sun tanning lamps fall into this classification of mercury vapor lamps which are designed so that they emit radiations of selected wave lengths of ultra-violet energy to produce the desired effect.

Since the lighting requirements of each plant do vary, there is indicated, for those who desire more detailed data, the need for reference to a recognized source of information. The American Standards Association has recently issued a revised American Standard Practice for Industrial Lighting (August 22, 1952) under the sponsorship of the Illuminating Engineering Society. The publication represents the lighting experiences of numerous organizations and, undeniably, is one that is a valuable addition to the files of metal finishing plants, both large and small.

Acknowledgment is hereby made to the General Electric Company and the Westinghouse Electric Corporation for their contributions of photographs and data in this presentation.

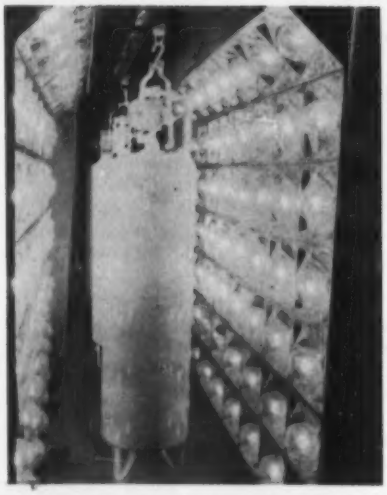
Detroit Arsenal's Engineering Building uses J-H1 color-corrected fluorescent mercury vapor lamps. Mounted at 25 feet in aluminum high bay fixtures over the machine shop, these lamps provide bright, safe working illumination for operators of sheet metal cutters, etc.

Two types of mercury vapor lamps are shown in closeup, with a color-corrected J-H1 fluorescent type being inserted into the fixture as a replacement for one of the A-H1 type. Both lamps draw 400 watts and operate from the same type of indoor ballast. The J-H1 provides 20 per cent more light with greatly improved color quality

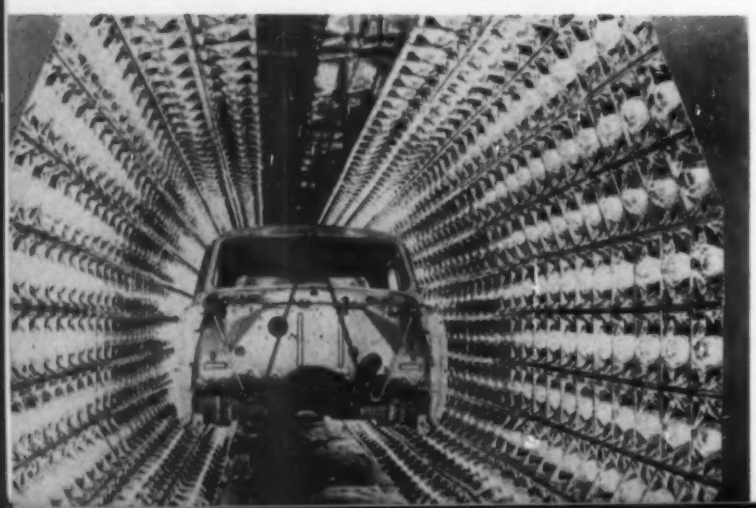


This is representative of a technique of inspection for surface irregularities. The light is controlled so that it hits the surface at a grazing angle causing the defects to stand out. Here zinc sheet is inspected. The installation uses eight 150-watt R-40 reflector spot lamps mounted on 6-inch centers. The lamps are on an adjustable mounting so that the best angle can be set. The same general technique works well in the inspection of many surface irregularities

Chromium plate must be inspected to see if it covers completely and is well polished. This must be done by detecting differences in color and specularity. Because the material is so shiny, it is difficult to get enough light comfortably to see the defects. The problem is solved by using a unit that has a large area and uniform, fairly low brightness. Although reflections of this source are seen in the material, they are uniform and low enough in brightness so that they are not distracting. The fixture in the photograph was made by bolting two rows of three industrial units each, side by side, and covering the bottoms with tracing vellum between two pieces of glass. Each unit contains two 85-watt fluorescent lamps. This fixture provides an illumination of about 85 footcandles which enables the inspector to see the defects easily

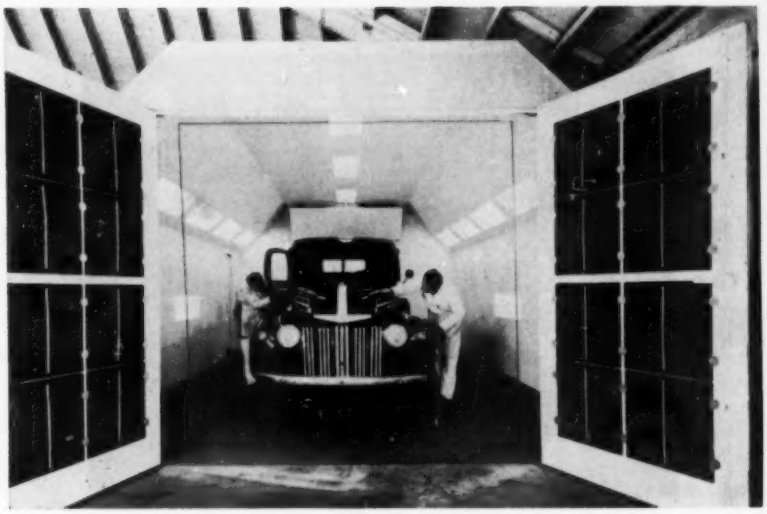


Panels of portably mounted 250-watt infrared lamps (about 56 on either side) complete drying of enamel on water softener cases in a few minutes while the cases progress through the operation on the conveyor

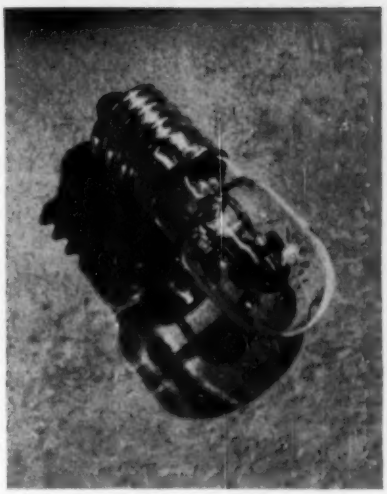


A car body presents a large complex surface, but the size and area of the drying oven permits its heat to reach every spot thoroughly on the ride through. This process, much improved since it was first introduced in the middle thirties, has produced a substantial economy in the automobile industry. Techniques for a greater variety of metal finishing operations have been widely adopted

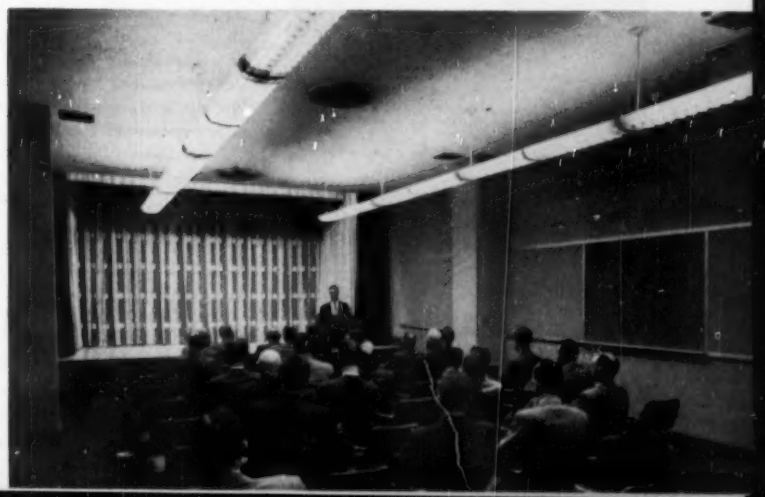
Finished precision castings are inspected under a combination spotlight and "black light". The blades are immersed in fluorescent oil, then rinsed; if cavities or cracks are present, they appear a bright yellow under "black light"



Finishing operations on large, glossy surfaces, such as a car or truck body, may present special seeing problems. Where spraying is done it is often desirable to segregate the operation from other work. A portable or semi-portable finishing room may be a good solution to obstacles normal to this work. The room shown here has built-in banks of fluorescent lamps and reflectors. All surfaces of the body, horizontal or vertical, are clearly lighted. Location of the several units assures this result. The reflectors are covered with diffusing glass panels, which also protect the units from paint accumulations. Walls of the portable are painted mat-white. Enameled surfaces and bright metal are more easily and accurately finished where all surfaces are illuminated with high level, diffuse quality lighting



Neon glow lamps are rugged low wattage lamps which are particularly useful for indicator lights. Their construction is simple—containing only two electrodes of various designs and coated with an electron emission material and sealed in a glass bath which is filled with neon gas



Germicidal lamps in the air conditioning system supplying the conference room eliminate harmful bacteria from the air. In the ceiling fixtures, 40-watt fluorescent sun lamps are installed to provide sun-tanning rays. Ozone-producing lamps can also be installed in the air conditioning systems and are suggested for practically any area where objectionable odors are a problem

A. E. S. 1953 CONVENTION COMMITTEES

Much of the success of an Electroplaters' Convention is directly dependent on the activities of the General Chairman who, in the case of the 1953 Convention, is Dr. Samuel Heiman.

Convention Committee Chairman Heiman has held virtually every office of the Philadelphia Branch, which includes two very active terms as President in 1949 and 1950. He is currently instructor of the branch sponsored electroplating class at Temple University Community College. It is mainly through Dr. Heiman's efforts that this class was organized.

Dr. Heiman received his B.S. in Chemical Engineering in 1930 and in 1948 received his Ph.D. from the University of Pennsylvania on completing a thesis on a new method of plating on aluminum.

During the period 1935–1942 he acted as plating consultant in the service of Graham, Crowley and Associates; in 1942 he worked in electrochemical research at Battelle Memorial Institute with Dr. Faust and, in 1943, he entered the employment of the Philadelphia Rust Proof Company, where he is Technical Director.

In the field of research Dr. Heiman has been quite active as attested by his several patents and numerous articles. He has received the Naval Ordnance Award for special research during the war.

In the production field, he is responsible for the smooth operation of all processes at Philadelphia Rust Proof Company, a job shop employing some 250 people and set up to perform virtually all commercial plating and inorganic coating operations.

As Chairman of the Convention Committee Dr. Heiman is arranging outstanding social and technical programs that will be of strong interest to all.

Samuel Heiman

The Ladies Committee

Committee Reports

The *Branch Exhibits* Chairman, Ed Ottens, reports that information pertaining to the exhibits has been circulated to Branch secretaries. It is urged that all platers be on the lookout for the unusual or exceptionally interesting products in their plant for use as exhibit material. For information consult your Branch Secretary or Second Vice-President.

Educational Committee Chairman Fred Fulforth has received several excellent papers for the Convention Technical Session but has expressed a need for even more material, especially papers pertaining to new developments or to new information on a standard practice.

The *Hotel Reservations* Committee is actively engaged in setting up room arrangements at the Headquarters Hotel, the Benjamin Franklin. Chairman Thomas Rodgers urges that you forward your reservation request to him at 1508 Hampstead Road, Penn Wynne, Pa. by March 15.

Outing Chairman Brooks Ricca is so enthusiastic about the boat trip he has planned for the Convention that he insists it be mentioned in every issue. There will be a planned program for those interested and there will be unorganized loafing and bull sessions for the rest.

An excellent *Ladies' Program* has been organized under the direction of the Ladies' Committee Chairwoman, Mrs. D. R. Robson. It starts off with tea and entertainment Monday afternoon at Wanamakers. In the evening the Metal Finishing Suppliers Association is sponsoring their annual supper dance.

Tuesday the "Aunt Ella" luncheon will be held at the ever-popular Drexelbrook Inn followed by a visit to the famous du Pont Longwood Gardens. On Wednesday there will be the cruise on the "Delaware Belle" with food, fun, and the Plato Party. Mrs. Joan Wiarda will act as hostess. Thursday the ladies will be guests at a special breakfast which will be followed by the ladies' annual educational lecture. The Grand Finale will be the Grand Banquet on Thursday night.

project No. 10

project director:
CHARLES A. WALKER*†

associate:
WALTER ZABBAN*

location:
YALE UNIVERSITY,
NEW HAVEN, CONN.

Acknowledgment is due the Research Committee, Dr. W. A. Wesley, International Nickel Company, Chairman; the Research Directing Sub-Committee, Mr. G. Cole, General Motors Corporation and Mr. Clarence Sample, International Nickel Company, Chairman and Supervisor, respectively; and the Project Committee; Mr. Henry B. Smith, R. Wallace & Sons Mfg. Company, Chairman; Mr. L. A. Danse and Mr. D. Milne, General Motors Corporation, and Mr. F. J. Holt, E. I. du Pont de Nemours & Company, for their contributions to this project.

*AUTHORS
†SERVED AS PROJECT DIRECTOR WHILE DR. B. F. DODGE WAS ON LEAVE OF ABSENCE

DISPOSAL OF PLATING ROOM WASTES

V. TREATMENT OF CYANIDE WASTE SOLUTIONS BY ION EXCHANGE

Introduction

This paper constitutes a report on the fourth part of an experimental investigation of methods for disposal of electroplating wastes containing cyanides. Other investigations which have been completed are:

(a) Oxidation of cyanides by hypochlorites

(b) Batch volatilization of hydrogen cyanide from solutions

(c) Formation of complex iron cyanides by treatment with iron salts and an alkali

[Reports on parts (a) and (b) have been published in Plating[1,2] and a report on part (c) is in preparation. An investigation similar to (b), as yet incomplete, is concerned with the volatilization of hydrogen cyanide in a flow process. The present paper is concerned with the removal of the cyanide ion and metallic cyanide complexes from aqueous solutions by the use of ion exchange resins.

The Nature of Ion Exchange

The nature of ion exchange resins and of the ion exchange process is most easily explained by consideration of a particular application. Consider, for example, the removal of sodium chloride from a dilute aqueous solution containing no other dissolved salts. Removal of the sodium chloride can be accomplished by evaporation, yielding a salt residue and a condensate of water of high purity at the expense of a considerable quantity of heat. This removal can also be accomplished by ion exchange to yield a small volume of a concentrated solution of sodium chloride (or sodium sulfate and potassium chloride, as noted below) and a large volume of water of high purity, the chief expenditure in this case being the cost of regenerating chemicals. The choice between evaporation and ion exchange for accomplishing this result involves an economic balance. Dilute solutions are most economically

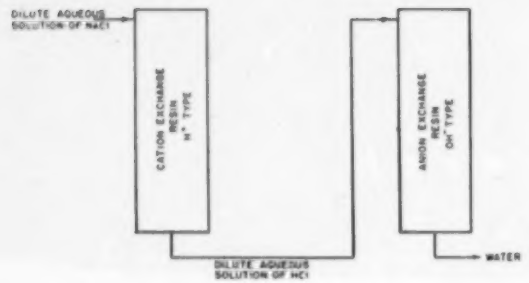

DILUTE AQUEOUS SOLUTION OF NaCl
CATION EXCHANGE RESIN H^+ TYPE
ANION EXCHANGE RESIN OH^- TYPE
WATER
DILUTE AQUEOUS SOLUTION OF HCl

Fig. 1. Simple Ion Exchange System

treated by ion exchange and more concentrated solutions by evaporation.

A cation exchange resin is a solid material of relatively high molecular weight containing ionic groupings such as the sulfonic acid group. They may be considered simply as the equivalent of sulfuric acid rendered insoluble by being attached to a high polymer. These resins in the hydrogen form function by exchanging their hydrogen ions for the sodium ions in the solution being treated. An anion exchange resin is a solid material of relatively high molecular weight containing ionic groupings such as amine groups. These may be considered as the equivalent of ammonium hydroxide rendered insoluble by being attached to a high polymer. These resins in the hydroxyl form function by exchanging their hydroxyl ions for the anions (chloride, sulfate, etc.) in the solution being treated.

A simple ion exchange system for the removal of sodium chloride from a dilute aqueous solution would consist of two vertical cylindrical tanks, one containing a cation exchange resin and the other an anion exchange resin. (See Fig. 1.)

As the aqueous solution is passed through the bed of cation exchange resin the following reaction occurs:

$$R{\cdot}SO_3H + NaCl \longrightarrow R{\cdot}SO_3Na + HCl$$

where R represents the high polymer to which the sulfonic acid group is attached. Thus the effluent from the cation exchange resin is a dilute solution of hydrochloric acid. This solution is passed through the anion exchange resin where the following reaction occurs:

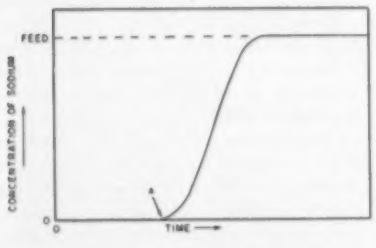
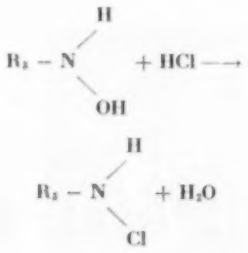


Fig. 2. Ion Exchange Exhaustion Cycle



The effluent from the anion exchange resin is water of relatively high purity.

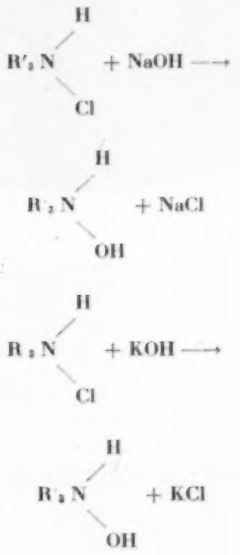
It is obvious that there must be a limit to the quantity of solution which can be treated by a given quantity of resin and that this is related to the number of ionic groups on the resin. If one determines the concentration of sodium in the effluent from the cation exchanger, as dilute aqueous sodium chloride is fed continuously to the resin, a plot of the type shown in Fig. 2 may be prepared:

For a period of time from zero to point *A* there will be obtained an effluent essentially free of sodium. Beyond point *A* (referred to as the break-through point) sodium will be detected in increasing concentrations until the ionic groups on the resin have been saturated and no further exchange occurs. In commercial operation the useful portion of the bed is defined by point A. Similar behavior will be exhibited by the anion exchange resin.

Thus as soon as either of the ion exchange resins has reached the break-through point the effluent is no longer of acceptable purity and it becomes necessary to restore the resins to their original form. This may be accomplished by using relatively concentrated solutions to reverse the ion exchange process. The cation exchange resin is regenerated by passing through it a solution of a mineral acid:

$$R{\cdot}SO_3Na + HCl \rightarrow R{\cdot}SO_3H + NaCl$$
$$2R{\cdot}SO_3Na + H_2SO_4 \rightarrow 2R{\cdot}SO_3H + Na_2SO_4$$

Thus the regeneration yields a relatively concentrated solution of sodium chloride (containing some excess hydrochloric acid) or sodium sulfate (containing some excess sulfuric acid). After regeneration is complete there will be contained in the bed a volume of regenerating acid which must be rinsed out before the bed is used again. Regeneration reactions for the anion exchange resin might be:



Thus the final result of the ion exchange process is the production of the following streams:

1. Water of high purity
2. Product of regeneration of cation exchange bed
3. Product of rinsing of cation exchange bed
4. Product of regeneration of anion exchange bed
5. Product of rinsing of anion exchange bed

Where dilute solutions are being treated the total volume of streams 2–5 will be small compared with the volume of water treated. In considering ion exchange for the treatment of industrial wastes, however, it must be realized that there remains the problem of disposing of these streams.

During the past few years highly effective research on the ion exchange resins has resulted in many new developments and modifications. Two recent books[3],[4] on the subject may be consulted for further details.

In considering the application of ion exchange to the problem of treating industrial wastes the following factors must be kept in mind:

1. At the present time there are few cases where ion exchange resins can be applied in such a way that selective reaction occurs; i. e., it is not in general possible to remove certain types of ions from solutions without also removing other ions present. For example, removal of small quantities of sodium cyanide from an

aqueous solution containing other dissolved salts can be accomplished only by removing all of the salts. The cost of regenerant chemicals is therefore dependent on the total dissolved salts.

2. The products of regeneration are relatively concentrated solutions containing both those ions which were present in the solution treated and those which are present in the regenerants. A primary objective in this work has been to regenerate in such a way that the solutions obtained might be useful in the plating industry.
3. Provisions must be made for disposing of rinse waters.

This investigation was undertaken because very little information was available on the application of ion exchange resins to the removal of simple and complex cyanides from solutions and because it was felt that recent advances in the field of ion exchange should be studied in relation to this problem. The ion exchange process is particularly attractive because it offers the possibility of recovering cyanides in useful form and because it is a technique which can be applied on either a small or a large scale.

The ion exchange behavior of metallic cyanide complexes, which are anionic in nature, could not be predicted satisfactorily from knowledge available before this investigation was undertaken. Consider, for example, a solution in which sodium ion is the most important cation present and the zinc cyanide complex the most important anion. It is conceivable that any of the following schemes might result in an effluent containing cyanides in concentrations below the toxic limits:

1. Use of cation and anion exchange resins in series.
   (a) Sodium ion exchanged for hydrogen ion in cation exchanger, resulting in acid solution of metallic cyanide complex; metallic cyanide complex exchanged for hydroxyl ion in anion exchanger.
   (b) Sodium ion exchanged for hydrogen ion in first part of cation exchanger resulting in acid solution; decomposition of metallic cyanide resulting from acidification, followed by exchange of metal ion for hydrogen ion in another part of cation exchanger, resulting in HCN solution from cation exchanger; exchange of cyanide ion for hydroxyl ion in anion exchanger.
2. Use of anion exchanger alone. Metallic cyanide complex exchanged for hydroxyl ion in anion exchanger, yielding an effluent containing sodium hydroxide.

The research reported here was approached by considering that it was necessary first to develop a method of ion exchange which would yield a satisfactory effluent. Regeneration methods were studied only for those methods which gave satisfactory effluents.

Review of Previous Work

Very little information may be found in the literature on the use of ion exchange resins in the removal of cyanide ions. Bloodgood and Losson[5] investigated the removal of the cyanide ion from potassium cyanide (KCN) solutions by both batch and flow operation. Their batch treatments were exploratory and indicated that cation and anion exchange resins placed in series were preferred to a single anion exchange resin.

In the flow treatment, the potassium ion was exchanged for the hydrogen ion on a cation exchange resin. The effluent from this treatment contained mostly hydrogen cyanide (HCN) which was later adsorbed on an anion exchange resin. The effluent from the anion exchange treatment contained approximately 0.2 ppm KCN as compared to 20.4–24.7 ppm of KCN in the original solution.

All of the information given in Bloodgood and Losson's[5] paper is based on exhaustion rather than regeneration.

In a second paper by the same authors[6] the cyanide solutions were passed through a cation exchange resin only. The anion exchange resin had been omitted from the system because it was attacked by HCN. The solutions used in this particular investigation contained sodium cyanide as well as calcium chloride, since the purpose of the investigation was not only the removal of cyanide from waste plating solutions but also the demineralization of the water, and it was felt that demineralized water had some advantages over tap water when used in plating baths. The hydrogen cyanide present in the effluent from the cation exchange treatment was removed by an elaborate aeration process where a thin layer of solution was allowed to fall along a porous hollow tube through which air was forced.

It may be seen that the investigations covered by the above-mentioned papers gave only preliminary information on the use of ion exchange resins in the removal of the cyanide and metallic constituents of waste solutions from electroplating operations. Furthermore, the resins used by the above authors[5,6] have been superseded recently by a number of newer resins which are far more effective and stable.

Apparatus, Analytical Procedures and Reagents

The apparatus used consisted of laboratory glassware. The ion exchange columns were made of ordinary glass tubing 1.1 and 2.7 cm (0.43 and 1.1 inch) in diameter. The resin was placed inside the tubes, resting either on a tight fitting nichrome wire screen or on glass wool. The tubes were stoppered at each end with provisions for inlet and outlet flow of the solution to be treated.

The flow of the solutions was kept constant by a constant gravity head and it was regulated by screw clamps. The flow rate was measured with a rotameter. Most of the lines carrying the solutions were made of Tygon tubing whose transparency enabled one to check for air bubbles.

A schematic diagram of the apparatus is shown in Fig. 3. Only the main lines are shown and not those for providing backwash of the resins.

A Leeds & Northrup glass electrode *p*H meter was used for accurate *p*H measurements, while *p*Hydrion paper was used for rough checks.

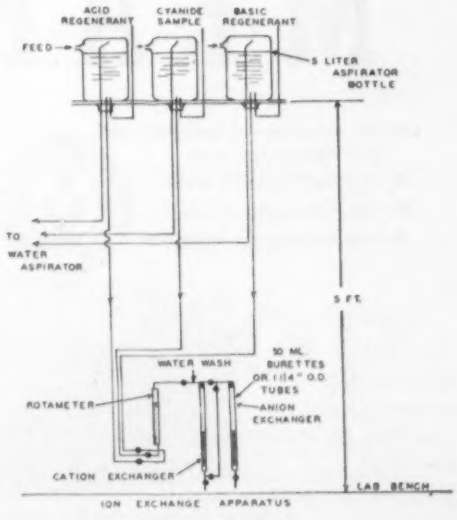


Fig. 3. Ion Exchange Apparatus

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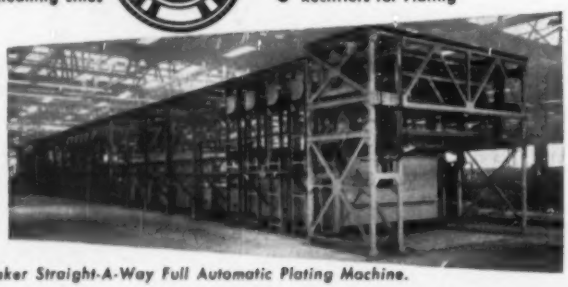

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Cyanides were determined by the Modified Liebig Titrimetric Method using KI and p-dimethyl-aminobenzalrhodanine as indicators for macro and semimicro-analyses respectively. Detailed descriptions of these methods may be found in a joint publication of A. E. S. Projects Nos. 2 and 10 in PLATING[7].

Zinc was determined volumetrically with standard potassium ferrocyanide solution by titrating to an excess and back titrating with standard zinc sulfate solution using p-ethoxychrysoidin as an internal indicator[8]. For traces of zinc the dithizone colorimetric method[9] was used.

Copper was determined iodimetrically in the cupric form by standard sodium thiosulfate solution, after being oxidized by nitric acid and bromine according to the procedure outlined in the Metal Finishing Guidebook[10]. For traces of copper the tetraethylene pentamine colorimetric method was used[11].

Silver was determined volumetrically by standard potassium thiocyanate solution using ferric ammonium sulfate as an indicator and following the same procedure for preparation of the sample as outlined in The Metal Finishing Guidebook[10]. Traces of silver were detected colorimetrically with p-dimethylaminobenzalrhodanine after removing all of the cyanide present.

The solutions investigated in this research were synthetic plating solutions with the exception of the silver plating solutions*. They were diluted, prior to treatment, to concentrations between 20 and 1000 ppm of total CN.

The solutions had the following compositions in the original concentrated form:

		g/l
1.	Copper plating bath	
	Cuprous cyanide	45
	Sodium cyanide	68
	Sodium carbonate	30
2.	Zinc plating bath	g/l
	Zinc cyanide	60
	Sodium cyanide	41
	Caustic soda	79
3.	Silver plating bath	g/l
	Silver	31.8
	Free cyanide (CN)	17.7
	Total cyanide (CN)	34.8
	Brightener	

The many aqueous regenerants that were used are given in the Appendix in the section on experimental data.

The ion exchange resins used were of both the weak and strong acid type in the case of the cation resins and of both the weak and strong basic type in the case of the anion resins.

(To be continued)

*Obtained through the courtesy of Mr. Henry B. Smith of R. Wallace & Sons Manufacturing Company, Wallingford, Conn.

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Q. 152. Can you advise us regarding a strip to remove chrome plated deposit over metal parts made from zinc sheet or zinc strip?

A. With regard to your letter requesting information as to how to strip chromium from zinc sheet we are inclined to believe that this cannot be done. We know of no one who does it and the chemistry of these metals would make the problem a very difficult one to solve.

However, if you have copper, nickel and chromium over the zinc, the problem can be solved by reverse etching in almost concentrated sulfuric acid at room temperature. This takes off the chromium and nickel. Then polish the copper and replate.—LOUIS DONROE.

Q. 153. We have a problem of silver-plating small metal stampings in small quantities at irregular intervals. In general, it is necessary to do each lot at once, so that they cannot be accumulated for a larger batch. Could you let us know if a very small plating barrel or similar equipment is available that could be held in a ready condition at all times to take care of small batches?

A. We believe a small Lucite portable plating barrel will solve your problem of silver plating small quantities of metal stampings, something of the order of 6 inch x 12 inch. (The names of suppliers were provided.)—D. G. FOULKE.

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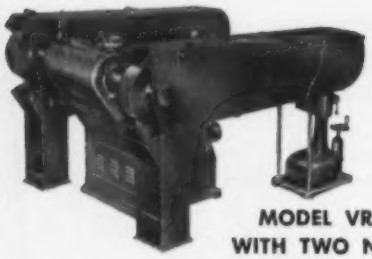

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Factors Affecting the Transformation of White to Gray Tin at Low Temperatures. R. R. Rogers and J. F. Fydell. Presented at the Electrochemical Society Fall Meeting, 1952.

The tendency for white tin, in the form of coatings and otherwise, to be transformed into gray tin is affected by the composition and thickness of the tin, the temperature at which transformation takes place, and the history of the tin prior to the transformation.

Electrodeposition of Selenium. R. Scott Modjeska, B. F. Freeberg and Kurt E. Schimkus. Presented at the Electrochemical Society Fall Meeting, 1952.

Investigation into methods for producing continuous, dense coatings of selenium was described. The report covers work in both aqueous and nonaqueous electrolytes. Results from cold aqueous solutions were amorphous red selenium, whereas, deposits from hot (80° C) solutions produced mixtures of black and red sooty deposits. As bath temperature approached the melting point of selenium, deposit tended more toward the metallic phase. Nonaqueous investigations included deposition from baths of alcohol, glycerine and glycols. The final work was done in solutions of phosphoric acid, effectively waterfree, using auxiliary anode chambers.

Electrodeposition of Silver from the Iodide Bath. T. L. Rama Char and R. Sadagopachari. Presented at the Electrochemical Society Fall Meeting, 1952.

Silver deposits from a complex iodide solution are white, dense, and adherent, and the bath is comparable to the cyanide bath in respect to quality of deposit, electrode efficiency, current density and throw-

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Some Properties of Stannous Sulfate Solutions and Their Role in Electrodeposition of Tin. II. Solutions with Stannous Sulfate and Sulfuric Acid Present. C. A. Discher. Presented at the Electrochemical Society Fall Meeting, 1952.

Density, refractive index, surface tension, viscosity, freezing-point depression, conductivity, transference number, electrode potential to pure tin and hydrogen, respectively, were measured for a range of stannous sulfate-sulfuric acid solutions. The effects of the sulfuric acid on these properties were discussed.

Electrodeposition of Cadmium from Fluoborate Solutions. T. R. Anantharaman and J. Balachandra. Presented at the Electrochemical Society Fall Meeting, 1952.

The optimum conditions for electroplating cadmium from its fluoborate solution were described. The best deposits of cadmium are obtained from a bath containing 210 g/l of cadmium fluoborate, 25 g/l of sodium fluoborate, 25 g/l of boric acid, and 1.0 g/l of sodium-β-naphthalene sulfonate at a pH of 3.2–3.6, temperatures of 20°-30° C, and at current densities of 20–60 amp/ft² (2.2–6.5 amp/dm²).

A Study of the Electrodeposition of Ruthenium from Very Dilute Solutions. M. H. Lietzke and J. C. Griess, Jr. Presented at the Electrochemical Society Fall Meeting, 1952.

The deposition behavior of ruthenium at low concentrations was investigated under a variety of conditions. Only when the ruthenium was in solution as the ruthenium nitroso complex were reproducible results obtained. Complete deposition was not possible at concentrations below 10^{-5} molar. A mechanism in-

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volving hydrogen reduction of the ruthenium nitroso complex was proposed.

Electroplating on Zirconium. W. S. Schickner, John G. Beach and Charles L. Faust. Presented at the Electrochemical Society Fall Meeting, 1952.

Methods were described for producing adherent electroplates on zirconium. As plated adhesion (about 6,000 psi) was obtained by prescribed etching of the zirconium surface prior to plating. Prebaking and heat treatment of nickel- or iron-plated zirconium produces alloy bonds of about 50,000 psi (as indicated by modulus of rupture). Other metals may be electroplated over diffusion-bonded nickel or iron plate.

Electroplating on Beryllium. John G. Beach and Charles L. Faust. Presented at the Electrochemical Society Fall Meeting, 1952.

Two methods for electroplating on beryllium were discussed: one method involves electrochemical and chemical activation of the beryllium for direct plating with other metals, and the other involves an intermediate replacement zinc film on the beryllium surface. Chemical polishing of beryllium was described. Alloying of the beryllium with the deposited metals and the effect on adhesion were also discussed.

Electroplating on Titanium. William H. Colner, Morris Feinleib and John N. Reding. Presented at the Electrochemical Society Fall Meeting, 1952.

Titanium is a very active metal which is normally covered with a stable and adherent oxide; it is even more difficult to plate than aluminum and magnesium. Conventional methods of preparing metals for plating (pickling, zinc immersion, etc.) will not yield adherent electroplates on titanium. Good adhesion has been obtained by subjecting titanium to an anodic etch in an essentially nonaqueous bath, based on HF and ethylene glycol. Operating conditions and variables were discussed.

Formation of Immersion Zinc Coatings on Aluminum. W. G. Zelley. Presented at the Electrochemical Society Fall Meeting, 1952.

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The manner in which immersion zinc coatings form on aluminum was described and the importance of such factors as composition of the zincate solution, operating conditions, and effect of surface preparation on the formation of the zinc layer was demonstrated. Several new modifications of the commonly used zinc immersion treatment were described. Finally, the manner in which the immersion zinc layer influences the performance of electroplated aluminum samples was considered and typical performance data were presented.

Metallizing Glass. E. Umblia. Glastek. Tidskr. **5**, 156-166 (1050). Bull Brit Sci Instrum Ress Assn, **6**, 338 (1951). Br. Chem. Abstracts **BI**, 569 (April, 1952).

Several methods of metallizing glass are reviewed and the applications of metal-coated glass discussed. The properties of rubidium and aluminum films and the preparation of the respective glasses are described, with details of a German apparatus and procedure for the cathode vaporization of metals. Vaporization under a high vacuum, and the vaporization characteristics of cadmium, zinc, magnesium, bismuth, antimony, lead, tin, chromium, silver, gold, aluminum, copper, iron, nickel, and PbS from solutions are described.

Finishes for Communications Equipment with Special Reference to Electroplate Coatings. E. C. J. Marsh (Std. Telephones and Cables Ltd.). J. Electrodepos. Tech. Soc. **28**, 69–88 (1952).

A general review of finishes used by the electrical communications industries, which embraces practically all known finishes. As a guide to selection of finishes, two tables are presented. Instead of the Electromotive Series Potentials, the Contact Potentials of various metals and alloys in sea water against a saturated calomel half cell at room temperature are regarded as being more practical, and these are given in one table. The other table is a general guide to metal to metal combinations (large areas vs. small areas) which have been found satisfactory in practice, and indicates each couple as suitable for mild, normal, or severe conditions of service, or not recommended.—*L. B. Sperry.*

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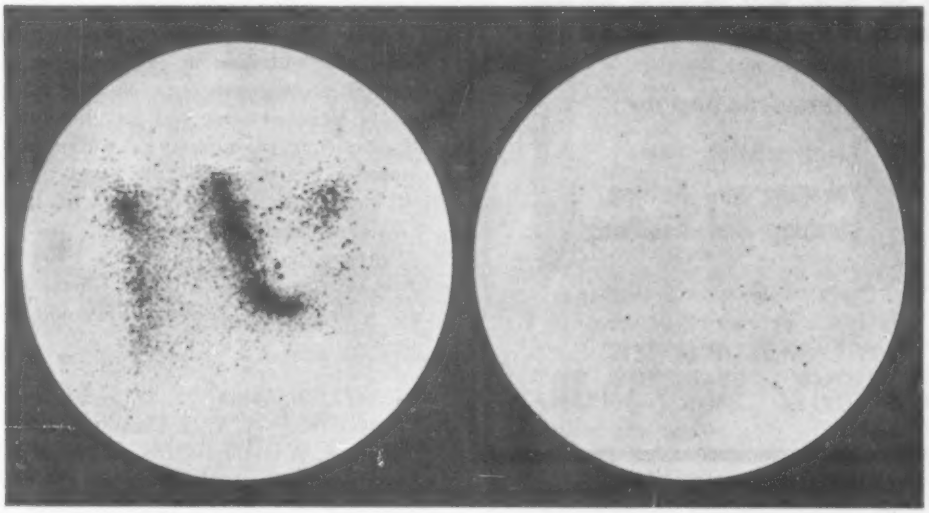

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Patent Abstracts

GEORGE B. HOGABOOM
Consultant, New Britain, Conn.

Copies of patents may be obtained by writing to Commissioner of Patents, Washington 25, D.C. Price 25 cents each.

No. 2,615,837, October 28, 1952—Electroplating Bath and Process—Andrew W. Liger, assignor to Wyandotte Chemicals Corporation.

CLAIM 5. The process of brightening deposits of nickel and cadmium in electroplating baths selected from the group consisting of an acid solution of a mixture of nickel chloride and nickel sulfate salts and an alkaline cyanide solution of cadmium oxide, which comprises adding 0.05–2.50 per cent by weight of sodium carboxymethylcellulose to the bath.

5 claims, 2 tables, 2 examples.

References cited: U. S. Patents 1,564,414; 2,061,592, Chemical Trade Journal and Chemical Engineering, Jan. 4, 1946, pp. 7–8. Metal Finishing, June 1940, pp. 315–317.

No. 2,615,840, October 28, 1952—Electrolytic Method to Remove Rust—A. A. G. Chapman, London, England.

CLAIM 6. A method of freeing metal surface deposits of rust, corrosion products and other foreign substances, comprising immersing a metallic article in an electrolyte bath maintained at about ambient temperature, passing an electric current between anode and the article as the cathode at a current density between 3 and 3½ amperes per square decimeter for a period of between about one-half and three and one-half hours, then reversing the current to render the article an anode for a period of about one-fifth the duration of the period in which the article acted as a cathode, then removing the article from the bath and washing it, said bath consisting essentially of an aqueous solution in about the following proportions per gallon of water:

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1— 1500 A. HVW 6/12 V.	1— 800 A. G. E. 28 V.
1— 800 A. HVW 6/12 V.	1—1500 A. Cent. 28 V.
1— 600 A. Eager 6/12 V.	1—2500 A. Cent. 28 V.
1— 500 A. Chandey. 12 V.	**30 to 60 V.**
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1— 200 A. Boissier 6 V.	1— 200 A. West. 32 V.
1— 200 A. U. S. 12 V.	1—1000 A. Cent. 32 V.
1— 150 A. HVW 6 V.	1—1000 A. Chandey. 40 V.
3— 125 A. Hobart 6 V.	1—1250 A. Cent. 45 V.
1— 120 A. Eager 7½/15 V.	1— 75 A. G. E. 50 V.
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Sodium hydroxide	3 lbs
Sodium metasilicate	3 oz
Sodium cyanide	7 oz
Sodium chloride	5 oz
Sodium fluoride	7/8 oz
Wetting agent of the class consisting of sulfated fatty alcohols and sulfonated oils	1/8 oz

CLAIM 7. The method set forth in claim 6 in which about one ounce of sodium stannate is added to the bath per gallon of water.

CLAIM 8. The method set forth in claim 6 in which about one ounce of sodium zincate is added to the bath per gallon of water.

11 claims, 16 figures, 2 tables.

References cited: U. S. Patents 1,324,317; 1,528,144; 1,954,473; 2,371,033. The Monthly Review, American Electroplaters' Society, June 1935, pp. 4–19. Journal of The Electrodepositors Society, Vol. 7 (1932), pp. 157, 158.

No. 2,616,841, November 4, 1952—Process of Reducing Cuprous Oxide Coatings to Produce Patterns or Designs, and Baths for Use in the Process—Jesse E. Stareck, assignor to Kansas City Testing Laboratory, Kansas City, Mo.

This invention relates to processes for reducing cuprous oxide coatings to produce patterns or designs, and to baths for use in the process.

The present invention provides an improved process and baths for the purposes stated above, and is an improvement on the process and bath disclosed in Patent No. 2,313,456 granted to me March 9, 1943.

CLAIM 5. In a process for electrolytically reducing cuprous oxide coatings to produce patterns or designs wherein an anode and the cuprous oxide coating as a cathode are immersed in a bath solution and an electric current is passed from the anode to the cathode, the improvement consisting in widening the voltage range for the current and coincidently producing more iridescent patterns of more uniform size than would otherwise be possible, said improvement being accom-

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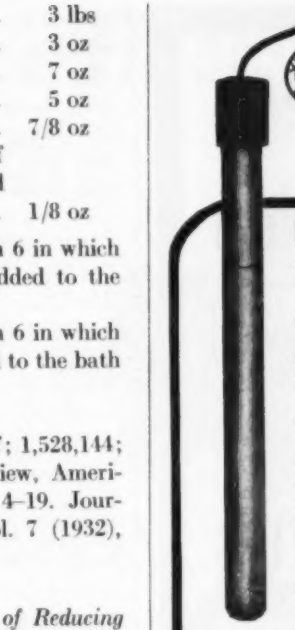

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plished by employing as the bath solution an aqueous solution consisting essentially of 7.5–60 g/l sodium hydroxide and 0.2—5 g/l ammonia, passing current from the anode to the cuprous oxide coating as cathode at a voltage in a widened voltage range of 1.6–12 volts and at a temperature of between 50 and 150° F to reduce the cuprous oxide to metallic copper.

10 claims, 5 examples.

References cited: U. S. Patents 271,901; 409,618; 768,818; 1,009,981; 1,526,127; 1,584,022; 1,807,326; 2,313,456. British Patent 258,726. Transactions Electrochemical Society, Vol. 80 (1941), p. 29.

No. 2,616,845, November 4, 1952—Electrolytic Polishing Apparatus—J. F. Kreml, assignor to Armco Steel Corporation, Middletown, Ohio.

CLAIM 1. Electrolytic polishing apparatus for top loading comprising in combination, flat anode means for supporting a batch of products to be polished and having openings therein smaller than individual products, cooperating flat open mesh cathode means above the anode and having opening therein of sufficient size to admit the products to the anode when charged onto the cathode, electrical insulating spacers fixedly secured to said anode and to said cathode and maintaining said open mesh cathode at effective electrolytic polishing distance above the product supporting zone of the anode, an electrolytic polishing solution, a container therefor, and means supporting said anode and cathode in substantially horizontal position in said solution.

3 claims, 2 figures.

References cited: U. S. Patents 574,038; 615,699; 742,131; 1,963,363; 2,390,282. Plating Rack Manual by Belke, published by Belke Manufacturing Company, Chicago, Ill. (1947).

No. 2,618,592, November 18, 1952—Electrolytic Process for Recovering By-Products from Industrial Waste Liquors—G. J. Horvitz, Woodmere, N. Y.

CLAIM 1. The process of treating liquor containing sulfuric acid and ferrous sulfate consisting in dividing the liquor into two separate streams, passing one stream through one series of chambers and the other stream through another series of chambers, maintaining the separation of each series from the other by diaphragms, impressing a positive electrical potential on the chambers of the one series, and a negative potential on the chambers of the other series, scrubbing each of said streams separately in the presence of sulfur dioxide, subjecting each stream to further electrolytic action, treating the one stream from the one series of chambers having the positive potential during the further electrolytic action with nascent hydrogen, treating the other stream with nascent oxygen during said further electrolytic action, to form a precipitate of hydrolized iron sulfate and sulfur in each stream, removing said precipitate from each stream separately, converting the ferrous sulfate remaining in the other

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stream into an insoluble salt to separate said insoluble salt from the sulfuric acid in said other stream, and boiling the remainder of first stream to concentrate the acid therein.

10 claims, 1 diagram.

References cited: U. S. Patents 1,278,308; 2,056,929; 2,120,840.

No. 2,619,454, November 25, 1952—Method of Manufacturing a Magnetic Recording Medium by Electrodeposition—P. P. Zapponi, assignor to The Brush Development Company, Cleveland, Ohio.

CLAIM 1. In the manufacture of magnetic recording medium having an exposed layer of permanently magnetic cobalt-nickel alloy material, the procedure of providing a core serving as cathode, and electrolytically depositing on the surface of the core a layer of magnetizable cobalt-nickel alloy from an aqueous solution comprising boric acid and material selected from the group consisting of nickel sulfate, nickel chloride, cobalt sulfate, cobalt chloride and mixtures thereof, the ratio of cobalt ion to nickel ion in solution lying between 2.75/125 to 1.25/2.75; maintaining the solution at a *p*H falling within the range of 2 to 5.5 and a total metal ion content of about 25 to 150 grams per liter; and passing through the solution a composite electrolyzing current comprising a direct component the R.M.S. value of the alternating current component being 2 to 5 times the value of the direct current component and the direct current density being between 20 and 300 amperes per square foot of exposed core surface, to produce a layer of magnetizable cobalt-nickel alloy having a coercive force of at least about 200 oersted.

CLAIM 2. . . . from an aqueous solution comprising essentially boric acid and material selected from the group consisting of cobalt sulfate and cobalt chloride, . . .

Legend. Solution B.

	g/l
$CoSo_4.7H_2O$	235
$NiSO_4.6H_2O$	110
$NiCl_2.6H_2O$	110
H_3BO_3	25

2 claims, 5 figures.

References cited: U. S. Patents 836,339; 934,601; 1,074,424; 1,800,947; 2,041,480; 2,165,027; 2,167,188; 2,190,667; 2,293,229; 2,316,303; 2,359,224; 2,443,599; 2,443,756; 2,515,192. Metal Industry, April 19, 1929, pp. 396–398; January, 1944, pp. 43–44. Journal Industrial & Chemical Engineering, September, 1917, pp. 841–844. Transactions Electrochemical Society, Vol. 80 (1941), pp. 579–583. Transactions Faraday Society, Vol. 24, part 6, June, 1928, pp. 348–358.

No. 2,619,456, November 25, 1952—Metal Recovery Apparatus—N. B. Aukerman, assignor to Sara A. Ingram, executrix of said Nathaniel B. Aukerman.

CLAIM 5. Apparatus adapted to be immersed in aqueous silver solutions and to deposit silver therefrom by electrolytic action, said apparatus comprising a zinc plate partially covered with an iron plate making electrical contact therewith, a tight fitting envelope of 30-point kraft paper enclosing said zinc plate and iron covering, and a copper ribbon spirally wound around the outside of said envelope and electrically connected to said iron plate.

6 claims, 3 figures.

References cited: U. S. Patents 577,134; 2,292,314. British Patents 451,703; 452,466; 928,031. Corrosion Resistance of Metals and Alloys, p. 33, McKay, 1936. Reinhold Publishing Corporation, New York, N. Y.

No. 2,623,848, December 30, 1952—Process for Producing Modified Electronickel. L. S. Renzoni, assignor to International Nickel Company, Inc.

The present invention relates to a process for the production in situ of electrodeposited nickel containing sulfur and, more particularly, to an improved process for production in situ of electrodeposited nickel containing sulfur and suitable for use as an anode in electroplating of protective and/or decorative coatings of nickel.

CLAIM 6. The process for producing nickel satisfactory for use directly in nickel electroplating baths as a nickel plating anode and having a good activity up to about *p*H 5.5 (Q) which comprises incorporating sulfur dioxide into a purified nickel refining electrolyte selected from the group consisting of all-sulfate electrolytes, all-chloride electrolytes, and sulfate-chloride electrolytes to provide a concentration of about 0.06 to about 0.5 grams per liter of sulfur dioxide in said electrolyte and to substantially reduce the *p*H of said electrolyte, the electrolyte *p*H after said sulfur dioxide introduction being within the range of about 2.0 to about 4.5, and said sulfur dioxide being sole active agent for introducing sulfur into nickel electrodeposited from said electrolyte, electrodepositing substantially pure nickel from said electrolyte in the presence of said sulfur dioxide without neutralizing the effects of said sulfur dioxide in reducing the electrolyte *p*H while depositing sulfur within the range of about 0.06 per cent to about 0.5 per cent in said nickel to produce electrolytic nickel having good activity where used directly as anode in electrodepositing nickel from nickel electroplating baths, and thereafter aerating said electrolyte to provide a purified electrolyte substantially devoid of sulfur dioxide and satisfactory for use in electrodepositing nickel of high purity substantially devoid of sulfur.

6 claims.

References cited: U. S. Patents 1,750,092; 2,066,347; 2,112,818; 2,115,019; 2,385,269; 2,392,798; 2,453,757. "Modern Electroplating". Special volume Electrochemical Society (1942), 242, 243. Roscoe et al, "Treatise on Chemistry", Vol. 1 (1920), 399, 401, 406, 407.

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ALOXITE TPT Aluminum Oxide	Tough, sharp. Grits 16 through 100.	Polishing operations involving removal of large amounts of metal (e.g. plowshares).
ALOXITE TPL Aluminum Oxide	Very sharp, friable. Grits 16 through 220. (It fractures during use, thus reduces loading of the wheel surface).	Polishing low tensile strength metals—copper, brass, bronze, aluminum.
ALOXITE TPC Aluminum Oxide	Medium sharp. Grits 16 through 220.	General purpose polishing grain—for removal of small amounts of metal.
ALOXITE TPW Aluminum Oxide	Powder. Grits 240 through 1000.	As the abrasive in paste heading of polishing wheels and belts.
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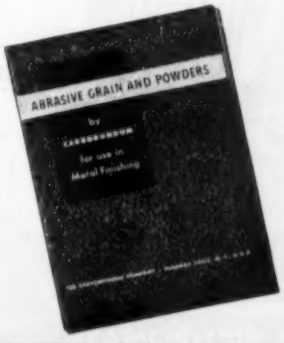

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Interim Meeting

Delegates representing 22 branches met at the Neil House in Columbus, Ohio on January 10, 1953. President F. J. MacStoker called the meeting to order shortly after 10:00 A. M. He addressed the gathering of 48, highlighting his talk on the theme of the morning session, "The Status of the Society Today".

First Vice-President G. P. Swift presented a financial statement in which the income and expenses of the Society were reconciled with the budget for the Society and in which was discussed the income and expenditures of the official journal.

Second Vice-President R. A. Schaefer reported that the membership of the Society had grown to over 5,900 and would reach 6,000 by the end of the fiscal year.

Third Vice-President C. Kelly introduced Dr. Earl J. Serfass who reported on the status of the A. E. S. Research Program at the present time. Mr. R. F. Ledford was introduced and he reported on the raising of Research funds.

Executive Secretary D. G. Foulke reported on Headquarters activities.

W. C. Dietrich, Advertising Manager of PLATING, addressed the delegates on problems associated with advertising.

The morning session closed with remarks by Dr. Samuel Heiman, Philadelphia Convention chairman.

The afternoon session, devoted to a discussion of future plans for the Society, was opened with an editorial hour in which talks were given by A. Korbelak, W. Geissman and M. B. Diggin that stressed the problem of procurement of suitable papers for PLATING.

Past President C. F. Nixon talked on the Society program as regards internal public relations and L. Weeg talked on broadening the base of the Society's operation.

Baltimore-Washington delegate F. Ogburn presented a proposal that would make provision for the election of delegates that could attend both the interim and convention meetings.

Cincinnati delegate C. Wise presented a proposal that would make provision for a change in Convention dates.

In addition to reports on the status of future conventions at New York, Cleveland and Washington offers to act as hosts in 1957 and 1958 were presented by delegates from Columbus and Boston.

The candidacy of Dr. Heiman for the office of Third Vice-President was advanced by the Philadelphia Branch.

Due to publication deadlines it has been possible to give but a brief summary of the interim meeting. Full details will be published in a later issue of this journal.

Branch News

COMING EVENT

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PAPERS AND SPEAKERS

PETER STEVENS, Chemist, Kenmore Metal Products, Jersey City, N. J., "Economic Advantages of Preplated Wire"

CLEVELAND F. NIXON, General Motors Research Department, Detroit, Mich., "Quality Plating"

DR. LOUIS WEISBERG, Chemical Engineer, "What of Tomorrow"

BALTIMORE-WASHINGTON BRANCH

On November 18, the Baltimore-Washington Branch met at the National Bureau of Standards, Washington, D. C.

Mr. THOMAS P. MAY of the International Nickel Company was introduced and commented on a set of sound-color films which were screened, entitled "Corrosion in Action". No branch business was transacted.

BOSTON BRANCH

Boston Branch met Thursday, December 4, at the Hotel Statler, with PRESIDENT ANDERSON in charge.

MYER SHAPIRO announced his comittee for the Annual Meeting as follows: Hotel, WALTER LARSSEN; Finance, LOUIS J. LOVE; Program and Publicity, ARTHUR W. COLLINS; Ladies, ANN BAKER LOVE; Banquet Seating, HOWARD WARDELL; Registration, R. HELGESON; Ticket Receipts and Reservations, GEORGE P. SWIFT; Ticket Records and Mailing, JAMES H. ANDERSON; Entertainment, HAROLD NARCUS; Education, E. A. FLORES and Speculative Assistant, MANSON GLOVER.

It was voted to accept the proposal of the Hotel Statler for the Annual Convention for either 1958 or 1959 and to present the offer at the Columbus meeting.

Discussion of the proposed change in meeting dates by Cincinnati Branch indicated a general disapproval of the proposal and it was voted to write Cincinnati accordingly with the reasons therefor.

LIBRARIAN FLORES then presented GEORGE D. BUTLER, District Sales Manager, Beckman Instruments, Inc., who spoke on "The Development of *p*H Instrumentation".

He presented an excellent talk, describing the calomel cell, and mentioning the Hydrogen, Quinhydrone and Antimony electrodes, showing the major defects in each. Continuing with the glass electrode, he traced its development through the

past thirty years down to the present day. He concluded his talk by recommending a general check test of a *p*H meter in the following steps: (1) Check meter by short circuiting the leads. (2) Test the batteries. (3) DR 105 tube should show when lit. (4) Turn all switches 4 or 5 times to insure clean contacts. (5) Turn all knobs in all directions. (6) Check tubes. (7) If it still doesn't work send it back to the manufacturer. A final word of caution was "*Never store glass electrodes in distilled water*". The *p*H 10 buffer is preferred and if not available tap water should be used. The meeting adjourned at 10:20 P. M.

GEORGE P. SWIFT, *Secretary*

CHICAGO BRANCH

The Chicago Electroplaters' Institute, an organization of job shop owners, were guests for the December 12 meeting. A total attendance of 108 members and guests enjoyed an excellent dinner, the educational program and refreshments before curfew sounded.

KEN CHAMBERLAIN, vice-president, H. N. Hartwell & Son, Boston, Mass., delivered an excellent description of the uses of rigid polyvinyl materials for plating room applications. Mr. Chamberlain ended his program with an impressive demonstration of legerdermain which completely mystified all in attendance.

EWELL MCCOY'S Research Finance Committee turned in a glowing report of accomplishment with their announcement of the signing of four new companies as sustaining members: Arnold, Schwinn & Company, Platers Technical Service, Atlas Plating Company and the Metalcraft Corporation, all of Chicago. CHARLIE GELDZAHLER deserves an accolade for some fine work as a member of Chairman McCoy's Committee.

Starting with the January meeting, Chicago Branch business meetings will be conducted on the second Friday of each month promptly at 6 P. M. and immediately preceding the regular educational meeting and dinner which is held on the same date.

RUDY HAZUCHA'S Banquet Committee promises a gala affair that will make all previous Chicago Branch affairs seem pale by comparison. Saturday, January 31, 1953, is the date and the Grand Ball Room of the Conrad Hilton Hotel is the place.

"THEY WERE THERE"

Great Lakes Plating Company attended in force with GUS PAVLIS, BOB BONAGUIDI and HANK PETERS . . . JACK DORF of Master Finishers shaking hands with the right one . . . HAL YOUNGER fully recovered from his bout with pneumonia . . . RALPH and BRUCE BELKE doing their part for the society . . . BILL JEFFRIES got out of court long enough to favor his favorite society with his presence . . . ART MURPHY on the scene once

1952
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more . . . Dick Scharff of Ironia, Mich., assisting Ken Chamberlain . . . Allen Brumm of Kuehne Manufacturing, Mattoon, Ill., declaiming on the use of black wrought iron for furniture . . . Charlie Baldion of Triplex Plating, Michigan City, Ind. . . . Bob Sizelove of the Newark Branch . . . Jack Curry, Frank Martinek and Bill Strelow making their Hotpoints . . . Orchids to Russ Harr for adding glamour to the meeting by escorting the charming Eileen Drews . . . Al Klomp and Oliver Smith of Sunbeam seen with Jim Vallone . . . The Kocour brothers, Orv and Les, out on passes . . . Note to Max Schneider—Ed Stanek has your pocket knife, the steak was tough . . . Did you know Art Bartmann was a bachelor? . . . Berteau-Lowell Plating Works represented by Joe Welnitzke and Erwin Elies . . . Glen Neely and Gus Brown of the Richardson Company learning about R.P.V.

CINCINNATI BRANCH

The Cincinnati Branch ended activities for the year with a meeting on December 17 at the Engineering Society Headquarters.

Transfer to our Branch from Buffalo of A. R. Waters, Harshaw Chemical Company, was announced. Ronald L. Griffith of Electric Auto-Lite was elected as a student member.

Charles Wise reported on the progress of the Educational Meeting and Dinner-Dance to be held on March 28, 1953.

Stewart Chipman suggested discussion of a picnic next summer which was received with the appointment of a committee headed by Bill Young as Chairman, aided by Bill Gordon and Dick Evans.

Dr. R. A. Schaefer, Director of Research, Cleveland Graphite Bronze Company and Second Vice-President of the A. E. S., was presented as our speaker. Dr. Schaefer took "Selected Cathode Shapes and Their Effect on Metal Distribution" as his subject, illustrating his entire talk with slides. He also discussed various Society problems pointing up the extreme difficulty in obtaining a sufficient quantity of able technical papers.

The meeting adjourned at 9:35 P. M. with MacDermid, Inc., acting as hosts for the usual social hour.

Charles Wise, *Secretary*

DETROIT BRANCH

President H. E. Head called the November 7 meeting to order. Twenty members of the Toledo Branch, who were special guests, were welcomed and also introduced was A. Granik, General Motors, Oshawa, Ontario.

Four applications for membership and two transfers to Detroit Branch were submitted and unanimously voted into the Branch.

Mr. Walter Pinner, Manager of the Process Development Division, Houdaille-Hershey Corporation, was the principal speaker and was introduced by Educational Chairman, Fred Wagner.

Pinner discussed "Problems for the Future", saying that he considered following some of the important problems in the plating industry:

1. There is no good non-destructive test for determining susceptibility to corrosion.
2. Why is a sandwich plate of nickel plated upon buffed nickel apparently more corrosion resistant according to ASTM tests than a single nickel plate of the same thickness?
3. Many investigators have found that working or forming of steel results in poorer corrosion resistance of subsequently applied electrodeposits. What are the reasons for this?
4. It is known that residual "slivers" or fragments of steel remaining on the surface from polishing operations lower corrosion resistance. How can steel be polished without forming these fragments?
5. As yet there is no good solution to the corrosion problem arising from the use of salt on highways during the winter months.
6. A more ductile bright nickel is needed especially for automobile bumpers.
7. More knowledge on copper buffing is needed—better techniques are necessary to prevent "cut-throughs" during buffing.
8. A corrosion test is desired which will satisfactorily replace the salt spray test. This problem is now being investigated by A. E. S. Research Project No. 15. Pinner requested the membership to submit in writing any suggestions which might be promising.
9. More knowledge is needed about the merits of a nickel plate as compared to a sandwich plate of copper and nickel.

Refreshments were served following adjournment of the meeting at 10:15 P. M.

Ed Kubis, *Publicity Chairman*

GRAND RAPIDS BRANCH

The October meeting was held at Finger's Restaurant with approximately 50 members attending.

Curtis H. Boos, of Lear, Inc., was elected as a new member and Russell Fancher of Wyandotte Chemical, Inc., was received as a transfer from the Detroit Branch.

Three new applicants were presented: Carl Lund, Muskegon Piston Ring Company; Donald De Fouw, Du Bois Company, and Rubert N. Burdick, Camfield Manufacturing Company.

Librarian Lyman Sperry introduced the speaker for the evening, William "Bill" Carr, Engineer at Lear, Inc., of Grand Rapids. His subject, "Autopilots and Guided Missiles", proved to be one of the most interesting talks ever given before the Grand Rapids Branch.

Mr. Carr first explained the working of the autopilot, and then continued his talk by discussing guided missiles. The speaker gave some very interesting side-lights on the use of the German V-2 rockets against the British Isles in World War II. Mr. Carr is a member of an exclusive twenty member club that investigates reports of "Flying Saucers". He stated that over 90 per cent of all reports are false.

A hearty round of spontaneous applause was given Bill Carr when he concluded his talk.

Approximately 50 members attended the November 7th dinner meeting at Finger's Restaurant. The meeting was brought to order by President Jack Hanney.

Eight applicants were voted upon and accepted as new members. They were: Robert N. Burdick, Camfield Manufacturing Company; Harry A. Davidson, Dochler-Jarvis Company; Donald De Fouw, DuBois Company; Carl Lund, Muskegon Piston Ring Company; George C. Miller, Furniture City Plating Company; D. A. Paull, Sealed Power Corporation; Addison Charles Snyder and Earl F. Taylor, Detrex Corporation.

A letter from Charlie Werft of Florida was read in which he offered a sum of money to be used for a paper award for the Grand Rapids Branch.

The educational session started with the showing of Part I of the color film from the International Nickel Company, "Corrosion in Action".

Librarian Lyman Sperry introduced the speaker of the evening, Gerald Lewis, Plastics Engineer at Keeler Brass Company, Grand Rapids. Mr. Lewis presented a most interesting and practical talk on "Vacuum Plating". He described the equipment necessary for the process, and that it is an easy matter to spend $200,000 for a production setup.

Mr. Lewis gave the steps to produce parts by the vacuum plating method as follows:

1. Preparation of base material.
2. Cleaning, drying and racking.
3. Apply lacquer undercoat and bake.
4. High vacuum plate.
5. Dip lacquer overcoat.
6. Dye topcoat for tinted shades.

Some of the troubles encountered as cited by the speaker were: excess humidity in summer months, power shut-downs, and vacuum leaks.

Mr. Lewis stated the vacuum process is now producing parts with less than 5 per cent rejects.

A vising vote of thanks to Mr. Lewis and then refreshments of beer and pretzels concluded the evening.

Ken Hampel, *Secretary*
Carl Green,
Publicity Chairman

HARTFORD BRANCH

As has been the custom in the past sev-

eral years the annual Ladies Night and Christmas Party was held in place of a regularly scheduled educational meeting. About 125 people were present at the Nutmegger House in Newington to enjoy a hot buffet dinner (Smorgasbord style)

As an after-dinner speaker, the Hartford Branch was fortunate in securing GEORGE BEAN, the famous Yankee Auctioneer. His talk on "People Will Buy Anything" was an amusing commentary on people attending auction sales. An explanation of how the sales originate and where the material for the sales come from was also brought out.

Door prizes were given out including a book written by Mr. Bean. Flowers were distributed to the women present as favors.

STANLEY PLATOZ, *Secretary*

INDIANAPOLIS BRANCH

On December 3, 24 members and guests met at the Fox Steak House. Guests at the meeting included H. ZINSMEISTER, speaker of the evening; CHARLES KELLY, C. PRITCHARD, L. STEVENS, J. CORNPROPST, L. RICHESON and M. WOODRUFF. MR. REIM of the Dayton Branch was also present.

The committee for the annual 1953 educational session and dinner-dance was announced as follows: ROMAN C. BENDER, General Chairman; AL KRIESE, Co-chairman; G. ROBERT VAN HOUTEN, Sustaining Contributions; FREDERICK ANDERSON, Entertainment; QUENTIN SHOCKLEY, Publicity; ELMER LUNDBERG, Tickets; HAROLD TOSSELL, Printing; CARL NIEHAUS, ROBERT ELLSWORTH and BILL SINCLAIR, Arrangements; EDNA ROHRABAUGH and JEANETTA PEACOCK, Favors; and BERT HAWHEE, Educational Session.

Bert Hawhee introduced the speaker of the evening, MR. HERBERT ZINSMEISTER of Wallace and Tiernan, who spoke on "Disposal of Plating Room Wastes". Much discussion took place at this meeting about the stream pollution code which has been enacted, effective January 1, 1953.

The meeting adjourned at 9:25 P. M.

EDNA ROHRABAUGH, *Secretary*

LANCASTER BRANCH

A monthly meeting was held November 14, at the Old Mill Inn, Lancaster, Pa. Thirty-five members and guests were in attendance. Two applications for membership were presented to the Branch.

After all routine business was transacted the speaker, MR. VERNON BURR of the United Chromium, Incorporated, was introduced by FRED FULFORTH. Mr. Burr talked on "Hard Chrome Plating". After a brief introduction on the difference between hard and soft chrome plate, he presented the S.R.H.S. bath as a means of obtaining hard chrome plate. Mr. Burr discussed the best manner to operate the bath and its advantages such as high speed, smooth plate, and its self-regulating feature.

After Mr. Burr answered a number of questions, the meeting was adjourned.

The December meeting was held at the Manufacturers Club, York, Pa., with 25 members and guests attending. CLAIR A. THOMAS, JR., and FRANK D. HALL were elected to membership. One member was suspended. HARRY HOVIS, who is serving as the liaison for the Lancaster Branch and the Philadelphia Convention Committee, asked for volunteers to serve on committees for the National Convention to be held in Philadelphia.

After all routine business was transacted the International Nickel Company's films, "Corrosion in Action", were shown.

HARRY A. SAYLOR,
Secretary-Treasurer

LOUISVILLE BRANCH

A regular meeting was held November 20 at Korfhages Restaurant, Louisville. PRESIDENT ARTHUR A. OERTEL opened the business and open meeting at 8:00 P. M. with 33 members and guests present.

Elected to membership were THOMAS J. WALSH, PATRICK TRIFILETTI and HARVEY R. CROSS.

THOMAS K. ALLISON was presented with a Past President's button in honor of his service during the fiscal year April 1, 1951 to April 1, 1952.

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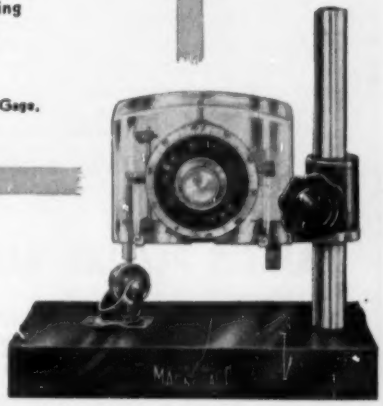

Write for Bulletin 2150-V

AMINCO Laboratory Instruments

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A Membership Roster Committee was appointed as follows: CHARLES R. ARBEGUST, Chairman; GERHARD HILLEBRAND, STANLEY J. BEYER, JOSEPH G. STERLING.

President Oertel introduced R. W. COUCH of United Chromium, Inc., as the speaker of the evening. Mr. Couch, in his talk on "Conversion Coatings of Zinc and Cadmium", traced the history of chromate finishes and chromate coatings using slides for illustration.

A General Electric Company film, "You Can Change the World", was shown to conclude the program for the evening.

J. G. STERLING,
Secretary-Treasurer

MELBOURNE BRANCH

The 75th regular Branch meeting was held at Melbourne Technical School on November 20 with PRESIDENT MERTON and 39 members and visitors present.

Two films, produced by Mond Nickel Company, "Precision Castings" and "Manufacture of Nickel", were screened at 7:30 P. M. by MR. GLEN WALKER.

Instead of the usual address, a technical program titled "Open Discussion on Plant Layout and Design" with an introductory by three speakers was presented:

1. Plant Layout—C. F. Corfe
2. Storage of Chemicals—J. Parker
3. Rectifiers and Installations—K. Leigh

An interesting discussion period followed.

Montreal Branch Annual Banquet

Best wishes and bon voyage were passed to Mr. C. F. Corfe, who is returning to the United Kingdom.

Meeting closed at 10:15 P. M.

S. B. PEARCE,
Secretary-Treasurer

MONTREAL BRANCH

Four hundred and fifty-one members and their guests had the pleasure of an excellent turkey dinner at the Annual Branch Banquet held on October 2.

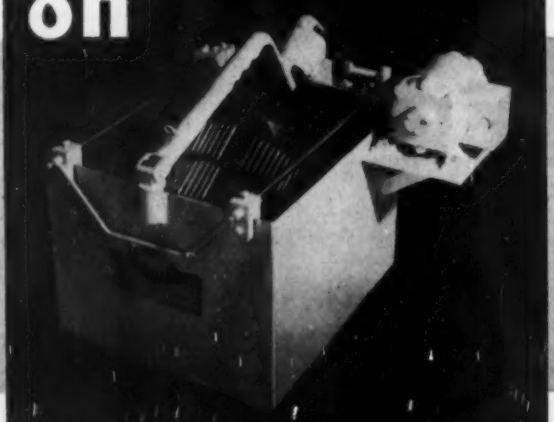
Door prizes were donated by various firms in the city and area around Montreal.

An interesting floor show of several good acts was also enjoyed.

The November meeting took place in the Mount Royal Hotel.

The guest speaker of the evening was HUBERT GOLDMAN, Technical Service Manager, from Enthone, Incorporated, New Haven, Conn., who talked on the "Adhesion of Electro-deposits, and New Methods of Cleaning and Oxide Removal". Slides were shown to illustrate the subject matter. Mr. Goldman also mentioned a process known as Alkaline De-rusting, which removes rust and most types of black oxide scale at room temperature in an alkaline bath.

THE NEW DANIELS 8H



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INDICATE A 278.

Branch News

During a brief business session MR. J. GUY ROBERGE, foreman plater of the Acme Shear Company, Canada Ltd., of Bedford, Quebec, was elected to membership.

NEW YORK BRANCH

A meeting was called to order by PRESIDENT AMATOR, on November 28, at the Hotel Statler, New York. After a short business session the meeting was turned over to LIBRARIAN P. VEIT, who in turn presented DR. WALTER MEYER, Enthone, Incorporated.

Dr. Meyer in his talk on the adhesion of electrodeposits and new methods of cleaning and oxide removal included a series of interesting color slides to point up his subject matter.

The December meeting was called to order by President Amator, at the Hotel Statler, New York. The following were elected to Membership, and duly installed: J. KUSHNER, R. WASILENSKI, J. KROBEL and T. Y. SUSSKIND.

LIBRARIAN M. NADEL then presented J. B. WINTERS, Technical Director of the R. O. Hull & Company, Inc. In his talk, Mr. Winters included the presentation of color slides to illustrate the practical control of plating baths with the Hull Cell.

LESTER LEVINSON,
Recording Secretary

NEWARK BRANCH

A regular meeting was held on November 21 at the Robert Treat Hotel. Applications for membership were announced as: EMIL TORSH, JOHN R. MIGLIN and OLIVER R. JACKSON.

Elected to membership were: MISS FERRIS HELMBOLD, ATTILIO L. BISIO, HUGH V. MCGUIRE, WILLARD REILEY, ROBERT PRESTON, ANTHONY BASILONE, and CATALDO CHIARELLI.

LIBRARIAN THOMAS AUSTIN introduced the speaker of the evening, AL KORBELAK, editor of PLATING. His subject was "Plating on Molybdenum and Tungsten".

LOUIS DONROE moderated in a question box session to conclude the evening's activities.

PHILADELPHIA BRANCH

A regular meeting was held on October 24, at the Harrison Laboratory of the University of Pennsylvania with about 30 attending. Following the readings of the minutes, FIRST VICE-PRESIDENT E. OTTENS, as chairman of the Membership Committee, reported that he had contacted all of the currently suspended members by mail or phone. DR. SAMUEL HEIMAN, chairman of the 1953 Convention Committee, reported briefly on the activities of the committee and the Waterbury meeting of the Editorial Board that he and MR. FREDERICK FULFORTH attended. LIBRARIAN CLARENCE BOERCKEL gave the schedule of speakers through March, 1953. Speakers for the April and May meetings were still to be obtained and suggestions from the members were solicited. Two applications for active membership were received. BRANCH PRESIDENT POPE appointed SECOND VICE-PRESIDENT TRUSDELL to head up the Good and Welfare Committee.

Dr. Samuel Heiman, Chief Chemist, Philadelphia Rust-Proof Company, was the speaker. His topic was "Metal Coatings for Corrosion Resistance Applied by Methods other than Electrodeposition". He stated tha platers, in general, know very little about the various types of metal coatings other than those electroplated. Yet, these are widely used in industrial processes and in many cases exceed plated coatings in value and usage. Types of coatings included in the discussion were: sprayed metal, hot dipped, metal clad, and cementation. The applicability of zinc, chromium, lead, tin and aluminum to be used by these coatings methods was discussed in detail, with special attention given to galvanizing, sheradizing, cladding, aluminizing and calorizing. Slides and specimens of the various coatings were used to illustrate the various items discussed. The meeting adjourned at 9:40 P. M.

I. WM. MARCOVITCH, *Secretary*

PHILADELPHIA BRANCH

The annual Educational Session and Banquet was held at the Broadwood Hotel on November 22 and was called to order by BRANCH PRESIDENT POPE at 2:00 P. M. with more than 70 members and guests attending. DR. SAMUEL HEIMAN, chairman of the 1953 Convention Committee, spoke briefly on the convention activities. Mr. Pope introduced as guests: DR. GEORGE SWIFT, Supreme First Vice-President; DR. D. GARDNER FOULKE, Executive Secretary, and MR. EZRA BLOUNT of "Products Finishing", recently returned from an extended visit to Japan.

LIBRARIAN CLARENCE E. BOERCKEL took over the meeting and introduced the speakers. DR. R. B. SALTONSTALL, Udylite Corporation, the first speaker, spoke on "Nickel Plating—Today and Tomorrow". The second speaker was MR. EDWIN P. OTTENS, Philco Corporation, who discussed the "Practical Aspects of Zinc and Cadmium Plating".

The final speaker was DR. W. L. MCCRACKEN, Detrex Corporation, whose topic was "Periodic Reverse and Ultra-Sonic Cleaning". Assisting in the demonstrations that were used with this talk were B. Z. RUBIN and E. J. HEIN, of the Detrex Corporation.

The Educational Session adjourned at 4:15.

The evening was devoted to the Banquet attended by more than 300. The Philadelphia Branch takes this means of expressing its appreciation to all of its members and the many advertisers in the banquet program who contributed so generously in making the affair the success that it was.

I. WM. MARCOVITCH, *Secretary*

PITTSBURGH BRANCH

The Branch held its annual Milwaukee Night Party on November 8. The idea of a mid-year party arose after the Milwaukee Convention, during which many local members attended the beer party. It is from this fact that the branch has been referring to their party as Milwaukee Night.

Approximately 125 people had a most

Philadelphia Annual Meeting and Banquet

enjoyable evening at the Norse Room of the Fort Pitt Hotel. They were entertained by organ music during the course of the evening and a delicious buffet supper consisting of weiners and sauerkraut was served to everyone along with plenty of free beer. COMMITTEE CHAIRMAN GLENN HERRING certainly did an excellent job in arranging such a successful affair and the group is looking forward to a continuation of these midyear social events.

R. H. SCHINDLER, *Secretary*

ROCHESTER BRANCH

The annual Rochester Christmas party was held December 20 at the Liederkranz Club in Rochester. A fine evening of good food, entertainment and dancing was enjoyed by over 100 members and guests who attended. Dinner music was provided by an accordionist who played numerous requests and accompanied group singing following the meal. Thanks to the generosity of our suppliers, a large number of door prizes were distributed after which the floor was cleared for dancing. The success of the party is a tribute to the good planning and hard work by the committee members, DON BLUM, VERN SCHAEFFER and PAUL PASNAK.

SAGINAW VALLEY BRANCH

The November meeting was held at Zehnder's Hotel in Frankenmuth and was attended by 82 members and guests. The dinner concluded, the meeting was opened by PRESIDENT L. J. MINBIOLE.

Membership Chairman BEN introduced two applicants for membership: ARTHUR E. FRANKLIN, JR., and LAURENCE M. NORBERG. Both were accepted bringing Branch membership to 94.

CLARK GEORGE, chairman of the Ladies' Annual Dinner-Dance, reported on work to date.

LIBRARIAN BRISSON introduced H. A. BARBAIN, Dow Chemical Company, the guest speaker for the evening. Mr. Barbain's timely talk on the surface treating of magnesium was supplemented with samples of treated parts. He concluded his talk with a Dow film on magnesium, "Treasures From the Sea". A question and answer period followed. The door prize was donated by Mr. J. WHITLEY of the Electric Products Company and was won by MR. LEO MANGETT of A. C.

D. WM. SNYDER,
Recording Secretary

ST. JOSEPH VALLEY BRANCH

A regular monthly meeting was held at the Hotel Elkhart, Elkhart, Ind., on December 3. Twenty-four members and guests were present at the dinner and 28 attended the technical session.

The following were elected to active membership in the Society: ROBERT MORGAN, Lake City Electroplating Works; EVERETT BROWNSLEY, U. S. Slicing Machine Company; EDWIN J. KROOK, Yale & Towne Corporation, and JAMES M. STAFFORD, Decatur Polishing Company.

JOHN BAYMAN requested assistance for the Sustaining Member Drive and the Branch donation to the Research Fund was discussed at some length.

LIBRARIAN RALPH BROUWER then introduced WAYNE R. FULLER, Director of Research at the Grand Rapids Varnish Company. Mr. Fuller discussed organic finishes for the electroplater. He classified these finishes into two main groups—namely: solvent drying types (nitro cellulose plastics) and conversion coatings—where film results after solvent drying are converted by heat and occasional use of a catalyst.

Clear coatings for chrome plated parts require very careful pretreatment before painting. A suggested method for cleaning is as follows:

1. Cold distilled water rinse.
2. Cold distilled water rinse.
3. Hot chromic acid rinse at 2 oz/100 gal. 165° F for 2 minutes. Sulfuric acid (0.2 per cent for long immersion to 4 per cent for very short immersion) and phosphoric acid rinses are also used.
4. Deionized water rinse.
5. Dip rinse in de-ionized water.
6. Dryoff at not more than 150° F.

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Mr. Fuller answered many questions from the floor pertaining to film thickness, method of paint application, paint tests.

The meeting adjourned at 9:45 P. M.

EUGENE ROTH, *Secretary-Treasurer*

ST. LOUIS BRANCH

Due to the desire of the members for a change of meeting place, the Board of Managers voted to hold the December meeting at the Y. M. C. A. At this meeting it was decided that the St. Louis Branch starting with the January meeting would from then on hold their meetings at the York Hotel.

LIBRARIAN BURNETT asked the members to return their meeting reply cards each month appropriately marked.

After the Dance Committee gave its report Mr. Burnett introduced Mr. W. S. MORRISON as the speaker of the evening. His discourse on the purification of water and electroplating solutions by the ion exchange method was one that will always be considered as one of the best sessions ever held in St. Louis.

ED HUNLETH, *Secretary*

SPRINGFIELD BRANCH

The November supper meeting was held on November 24 at the Ivy House, West Springfield. During a short business meeting plans were started for the Regional that is to be held in Springfield in the Spring. EDWARD KOETSCH, JR., First Vice-President of the Branch, was named chairman.

ADIN D. BAILEY, Swift Industrial Chemical Company, was elected to membership and GEORGE HAAS was transferred to the Bridgeport Branch.

LIBRARIAN HEROUX introduced our speaker of the evening, CHARLES OSTRANDER, Service Manager, Allied Research Products. He discussed the variations and modifications and uses of Iridite.

After a spirited discussion period that followed the talk the meeting was adjourned.

ROBERT J. GIRARD, *Secretary*

SYRACUSE BRANCH

The November meeting was held at the Moose Hall on November 17 with 34 members and guests present. A Dutch treat turkey dinner was served those attending the dinner.

MR. MANSON GLOVER, President, Glover Coating Company, Malden, Mass., spoke on the topic, "Getting Your Money's Worth Out of Tank Linings". He gave the Branch one of its finest talks. His natural wit and broad knowledge of the subject gave all their money's worth of information about tank linings.

Refreshments were provided by the Frederick Gumm Chemical Company, Kearny, N. J., with their representative, Ed Hollister, as host.

On December 13 the Syracuse Branch held its Fourth Annual Christmas Party at Aureli's Restaurant, Liverpool, N. Y. An excellent dinner was served 151 members and guests. Many out-of-town members attended.

Numerous door prizes, donated by suppliers and platers, delighted the many lucky members. Oneida Limited of Oneida, New York, provided all the ladies present with silver demi-tasse spoons.

MR. WILLARD PHILLIPS and MR. ART MARTINEAU, SR., Christmas Party Co-chairmen, wish to thank the many suppliers, platers and cooperating members for the success of the party.

LINDLEY S. WOOD, *Secretary*

TOLEDO BRANCH

The Toledo Branch forfeited their regular November meeting in favor of a surprise visit to the Detroit Branch. Nineteen members left Toledo in a chartered bus at 6:30 P. M. The members of the Branch were tremendously impressed by the business meeting conducted by the President, HERBERTH E. HEAD; the talk by WALTER PINNER on the problems to be solved by the plating industry, and the lively discussion period after the talk, in which so many members participated.

The trip home was like a good old-

(*Continued on page 198*)

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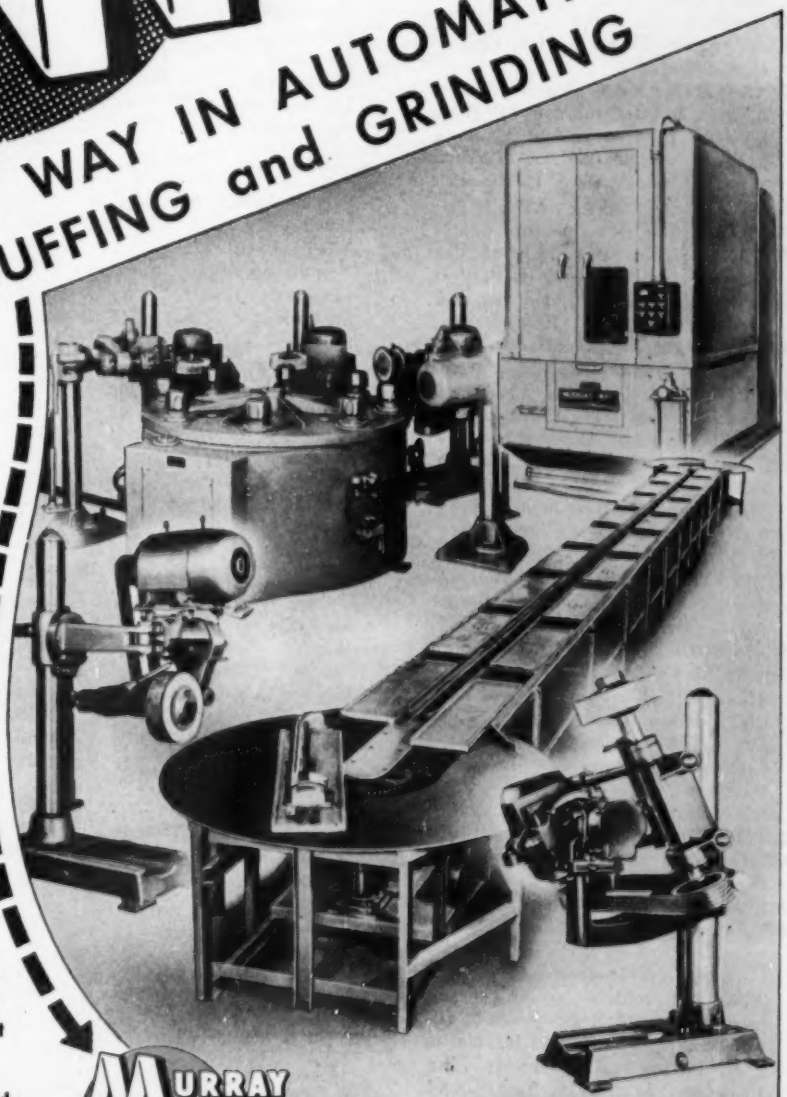

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Membership Report of the A. E. S.

Elections

BOSTON: James A. Dugan, Norman Peterson, Samuel M. Polcari, Bernard Steinberg

CHICAGO: Robert N. Blumenthal, Donald Chiz, Gerald P. Glab, Robert W. Oehlsen, Deane C. Smith, Raymond M. Sides

CINCINNATI: Ronald L. Griffith

DETROIT: Donald C. Martyn

GRAND RAPIDS: Nathan H. Bryant, Jr., Samuel G. R. Destefano, John Dornbos, William J. Gavin, Jr., Elzy P. Souerwine

HARTFORD: Vernon H. Dunbar, William J. Smith

HOUSTON: Don Foster

LANCASTER: Frank D. Hall, Clair A. Thomas

LOUISVILLE: Mario Clementi, Harvey R. Cross, Paul J. Grote, Alfred O. Hook, John S. Houston, Linford L. Jones, Ray J. Nardelli, Patrick Trifiletti, Thomas J. Walsh, Harry L. Wuebbold

MILWAUKEE: James W. Albus

MONTREAL: J. Guy Roberge

NEW YORK: Thomas E. Anderson, Paul Hudec, Charles T. Lambert, Basil D. Lovelock, Anthony J. Madonna, William C. Payne, Lino R. Rosa

PHILADELPHIA: Jack H. Goodyear, Eugene A. Winiarski

ST. JOSEPH VALLEY: Everett L. Brownsey, Edwin J. Krook, Robert Morgan, James M. Stafford

ST. LOUIS: Robert DeGuire, Ward W. Kelley, Don E. Koehler, Clarence A. Meyer, Edward Mroz, John A. Pauly, Melvin V. Shaw, Ernst F. Sturm

SPRINGFIELD: A. D. Bailey

TOLEDO: Edward P. Agnew, Morris E. Applegate, Earl W. Brillhart, Gorden S. Deye, Donald M. Miller, W. J. Miller

WATERBURY: Albert G. Griffith

MEMBER-AT-LARGE: James T. N. Atkinson, Halifax, Nova Scotia, Canada; Gustavo Gomez, Havana, Cuba; Jan R. LeBleue, San Francisco, Calif.; Lawrence B. Timmis, Kent, England

Reinstatements

BOSTON: Eugene M. Pfingston

CHICAGO: Fred J. Bryan, George G. Duncan

MELBOURNE: L. P. Nation

PHILADELPHIA: Samuel L. Groff

Transfers

William B. Johnson to Los Angeles from Chicago; H. R. Smallman to Los Angeles from Chicago; A. R. Waters from Buffalo to Cincinnati; Allen S. Brumm to Chicago from Grand Rapids; G. Paul Beardsley to Saginaw Valley from Milwaukee; Henry D. Bowen, Jr., to Louisville from Philadelphia; Robert H. Tiers to Hartford from Philadelphia; Erwin Sohn to Mem-

Membership Competition

BRANCH	Membership Apr. 1, 1952*	New Members	Net Change in Membership	Per Cent Net Change
First Group				
Milwaukee	145	16	+13½	+ 9.3
Toronto	132	12	+12	+ 9.1
New York	305	27	+24	+ 7.9
Grand Rapids	155	17	+10	+ 6.5
Newark	240	14	+10½	+ 4.4
Boston	140	5	+ 3	+ 2.1
Hartford	148	8	+ 2½	+ 1.7
Detroit	491	32	+ 8	+ 1.6
Bridgeport	154	3	+ 1½	+ 1.0
Pittsburgh	132	12	− ½	− 0.4
Chicago	469	52	− 3½	− 0.7
Cleveland	212	12	− 3½	− 1.7
Melbourne†	168	19	− 8	− 4.8
Los Angeles	218	3	−11	− 5.0
Philadelphia	203	11	−12	− 5.9
Second Group				
Saginaw Valley	71	14	+14	+19.7
Rochester	88	22	+15	+17.0
Montreal	72	8	+ 7	+ 9.7
New Haven	88	7	+ 8	+ 9.1
Cincinnati	80	7	+ 6½	+ 8.1
St. Louis	102	8	+ 8	+ 7.8
Syracuse	104	10	+ 1	+ 1.0
Buffalo‡	107	4	0	0
Waterbury	115	1	− ½	− 0.4
Baltimore-Washington	96	5	− 2½	− 2.6
Dayton	81	7	− 3½	− 4.3
St. Joseph Valley	74	6	− 3½	− 4.7
Sydney	86	5	− 4	− 4.7
Providence-Attleboro	92	4	− 5½	− 6.0
Indianapolis	114	3	−11	− 9.6
Rockford	79	3	−15	−18.9
Third Group				
Louisville	24	25	+23	+95.8
Wichita	...	12 (19)	+12	+63.2
Toledo	39	10	+13½	+34.6
Western Ontario	19	8	+ 4	+21.1
Houston	40	11	+ 7½	+18.8
San Francisco	67	11	+10	+14.9
Hamilton	22	3	+ 3	+13.6
Kansas City	...	4 (34)	+ 4	+11.8
Dallas-Fort Worth§	69	15	+ 7½	+10.9
Adelaide	58	6	+ 6	+10.3
Allentown-Reading	44	4	+ 4½	+10.2
Southeastern	47	13	+ 4½	+ 9.6
Springfield	55	4	+ 3½	+ 6.4
Jackson-Lansing	59	4	+ 3	+ 5.1
Lancaster	67	6	+ 3	+ 4.5
Twin City	66	8	+ 2	+ 3.0
Columbus	54	7	− 1½	− 2.8
Outside Competition				
At Large	125	18	+19	.....
In Transfer	23	..	.....	.....
Total A. E. S.	5,739	579	+242	+ 4.2

Active Membership, November 30, 1952 5,971

*Subject to correction. †, ‡, §Winners in first, second and third group, respectively, of 1951–1952 membership competition.

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1—6000/3000 AMPERE, 6/12 VOLT, **BOGUE.**
1—5000/2500 AMPERE, 6/12 VOLT, **CHANDEYSSON,** 25° C.
2—5000/2500 AMPERE, 8/16 VOLT, **ELECTRIC PRODUCTS,** 25° C.
1—5000/2500 AMPERE, 8/16 VOLT, **CHANDEYSSON,** 25° C.
1—5000/2500 AMPERE, 6/12 VOLT, **EAGER.**
1—3000/1500 AMPERE, 6/12 VOLT, **HANSON-VAN WINKLE-MUNNING CO.**
2—3000/1500 AMP., 6/12 V., **COLUMBIA,** Synch.
1—2000/1000 AMPERE, 6/12 VOLT, **MUNNING** "OPTIMUS."
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1—500 AMPERE, 40 VOLT, **"M. G. C.".** Exciter-in-Head.
1—400 AMPERE, 40 VOLT, **"M. G. C."** Exciter-in-Head.
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1—2000 AMPERE, 6 VOLT, **G. E.** COPPER OXIDE RECTIFIER.
1—**GREEN SELECTOPLATER,** 1800 AMPERE, 12 VOLT.
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3 HP, 5 HP, 7½ HP and 10 HP, **DIVINE, HAMMOND, "M. G. C.", GARDNER, TWIN** 5 HP and **TWIN** 7½ HP **ROME,** and other popular makes.

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Suspensions

HOUSTON: N. C. Copeland, H. W. Fahrenthold, Pleas B. Kennerly, Jr.

LANCASTER: Joseph Kistler

NEW YORK: Josiah M. Kane

Deaths

BOSTON: Louis A. Gale, Sylvester C. Pearsall

CINCINNATI: Martin M. Gannon, Jr.

INDIANAPOLIS: A. L. Chesterfield

Branch News

(*Continued from page 198*)

fashioned get-together, being highlighted with a breakfast at Flat Rock, Mich.

The following members, EDWARD AGNEW, MORRIS APPLEGATE, EDWARD ST-ARNAUD, GASTON BERGEMAN, ARTHUR CRUSE, DONALD DETTINGER, HAROLD DUGGAN, WALLACE FRIEDEL, GAYLE GOLDSWORTHY, JACK GOLDSWORTHY, BEN GOMERSALL, HAROLD GRUTTER, DONALD MILLER, WALLACE MILLER, WALTER MORROW, GLENN NOE, ALBERT SZYMANOWSKI, CLEON TRIPLETT, and WALTER WEIKER, were well pleased with this type of activity.

BEN GOMERSALL, *President*

TWIN CITY BRANCH

The Twin City Branch met on December 1 at the Pine Tavern in Minneapolis with 31 persons present.

Following dinner PRESIDENT JEROME M. WELLER introduced the following guests: MESSRS. CHARLES C. ZUEL, Hiawatha Metalcraft Company; GEORGE BELAIR and R. S. CARLSTROM, Merchants Chemical Company; JOHN R. GOLDEN and BERNARD J. OLSON, Brown and Bigelow. MR. CLIFF BARTH of Merchants Chemical Company was introduced as a member transferring to the Twin City Branch from the Cincinnati Branch and was given a welcome.

President Weller spoke briefly on the plant visitation program and then introduced MR. JOHN R. GOLDEN, manager of the novelty department, Brown & Bigelow Company, Minneapolis, who spoke briefly on the sales and production of Brown & Bigelow's novelty items. DR. FRANK IRELAND, Technical Director of Brown & Bigelow and member of the Twin City Branch, spoke on the processes involved in the plating on plastics. Following the discussion on these processes the group was taken to the Brown & Bigelow Plant and viewed the electroplating and buffing operations there.

ROBERT L. BUCKLEY,
Secretary-Treasurer

ALL PLASTIC PLATING TANKS are not PLA-TANK®

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Naturally we've had imitators. Every good idea has. We're proud that PLA-TANK is the pioneer name in the resin-bonded Fiberglas® tank field and hundreds upon hundreds of our customers are happy with the service they're getting from their PLA-TANK products.

Occasionally some one succumbs to the lure of a lower price or a glossy paint job or a smoother finish and passes up PLA-TANK'S superior features. When they have a failure they condemn plastic tanks as a whole.

Before buying any plastic tank, CHECK THESE PLA-TANK FEATURES

Every unit is made individually by custom layup molding. This personal attention to each square inch of surface is the only way to guard against weakening dry spots and brittle resin buildups.

Translucent material insures against possibility of hidden flaws. Every particle of PLA-TANK is like every other particle — same resistance inside and out, all the way through. No surface coats or paints to cover defects.

Tanks are built to basic hydraulic principles of design. Reinforcing ribs are horizontal to prevent deflection. Corners are built up triple, edges double for added strength and longer service.

Over 150 standard sizes in rectangular and cylindrical tanks are available. Write for size, price and data sheets.

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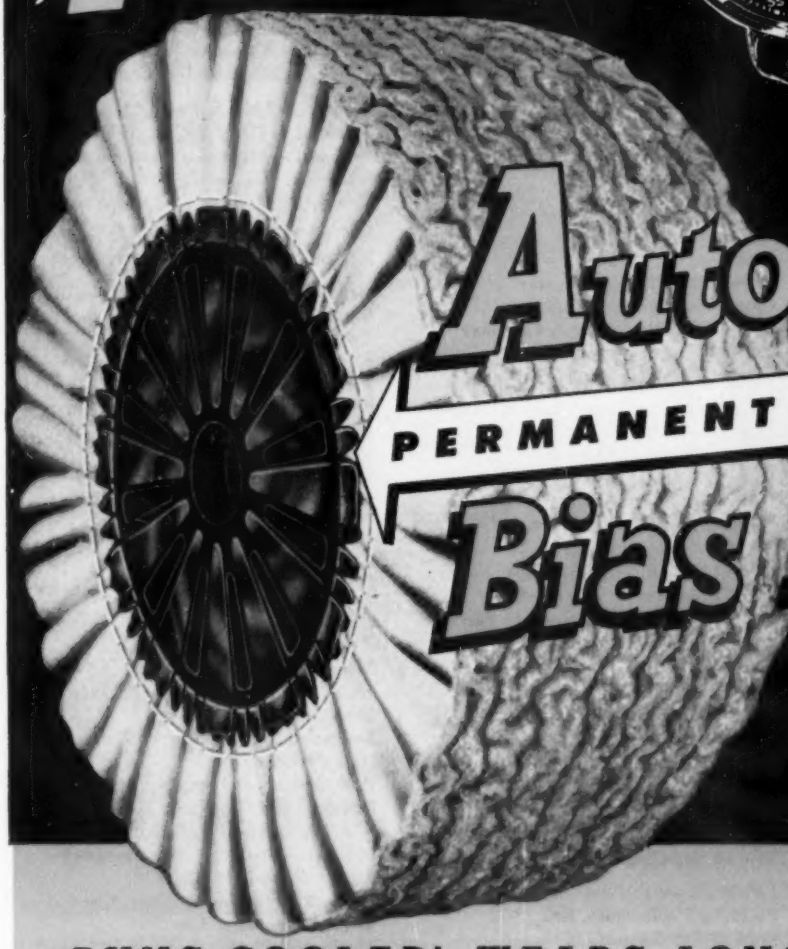

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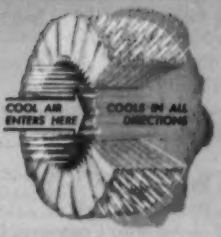

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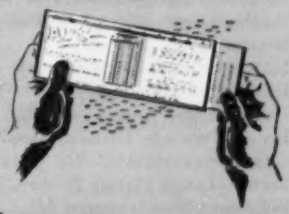

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(Figures in parenthesis indicate number of memberships held)

Accurate Electro-Plating, Inc.
Accurate Engineering Laboratories
Acme Galvanizing, Inc.
Acme Plating Company, The
Acme Steel Company
Adolph Plating, Inc.
Advance Plating Company, The
Aetna Electroplating Company
Alert Supply Company
Allen-Bradley Company
Allied Industrial Products, Inc.
Allied Research Products, Inc.
Alsop Engineering Corporation
Aluminum Company of America
American Anodizing & Plating Company
American Buff Company
American Cabinet Hardware Corporation
American Can Company
American Chemical Paint Company
American Fixture & Manufacturing Company
American Flange & Mfg. Company
American Hot Dip Galvanizers Association, Inc.
American Instrument Company
American Nickeloid Company
American Radiator & Standard Sanitary Corporation
American Smelting & Refining Company
American Wire Fabrics Corporation
American Zinc Institute (5)
Apex Plating Company
Apollo Metal Works
Apothecaries Hall Company
Ardco, Incorporated
Armco Steel Corporation
Arnold, Schwinn & Company
Arrow-Hart & Hegeman Electric Company
Arrow Plating Company, Inc.
Arvin Industries, Inc.
Atlas Plating Works
Auto City Plating Company
Automotive Rubber Company
Autoyre Company, Inc.

Baker Bros., Inc.
M. E. Baker Company
Bart Laboratories Company, Inc.
Bart-Messing Corporation
Bastian-Blessing Company, The
Beacon Supply Company
Belke Manufacturing Company
Bell & Howell Company
Bell Telephone Laboratories, Inc.
Bendix Products Division, Bendix Aviation Corporation
Berteau-Lowell Plating Works
Bethlehem Steel Company (2)
Blakeslee, G. S. & Company
Briggs Manufacturing Company
Brookline Electro Platers, Inc.
Bruce Products Corporation
Buckeye Products Company, The
Buckingham Products Company

Chase Brass & Copper Company
Chemical Corporation, The
Chicago Electro-Platers Institute
Chicago Roller Skate Company
Chicago Thrift-Etching Corporation
Christie Plating Company
Chrome-Rite Company (2)
Chromium Corporation of America
Chromium Process Company, The
Chrysler Corporation (2)
Cinch Manufacturing Corporation
Clayton Mark & Company
Cleveland Graphite Bronze Company, The
Clinton Company, The
Clinton Supply Company, Inc.
Codman, F. L. & J. C., Company
Corona Corporation
Cowles Chemical Company
Crane Company
Croname, Incorporated
Crown City Plating Company
Crown Cork & Seal Company
Crown Rheostat & Supply Company
Cutler-Hammer Company

Darco Dept., Atlas Powder Company
Davies Supply & Manufacturing Company
Daystrom Corporation
Detroit Plating Industries
Diamond Alkali Company
Diversey Corporation, The
Dixie Electro Plating Company
Doehler-Jarvis Corporation (2)
Donald Sales & Mfg. Company
R. R. Donnelley & Sons Company
E. I. duPont de Nemours & Company
Dura Div., Detroit Harvester Company
Dura-Chrome of Chicago, Inc.

Eastman Kodak Company (2)
Eaton Manufacturing Company
Ekco Products Company
Electric Auto-Lite Company, The (2)
Electrolux Corporation
Electro-Platers Company
Enthone, Inc.
Erie Plating Company

Felt & Tarrant Manufacturing Company
Finishing Publications, Inc.
Ford Motor Company (5)
Formax Manufacturing Company
Fox Products Company
Frigidaire Division, General Motors Corporation

Gemex Company
General Electric Company
General Motors Corporation (5)
Gerity-Michigan Corporation
Gorham Manufacturing Company
Graham, Crowley & Associates, Inc.
Graham Plating Works
Grand Plating Company
Grand Rapids Plating Company
Great Lakes Plating Division
Gumm Frederick, Chemical Company

C. Hager & Sons Hinge Manufacturing Company
Hall-Mack Company
Hamilton Watch Company
Hammond Machinery Builders, Inc.
Hanson-Van Winkle-Munning Co. (3)
Harding Manufacturing Company
Hardwood Line Manufacturing Company
Harshaw Chemical Company, The (3)
Haviland Products Company
Heil Process Equipment Corporation
Heywood-Wakefield Company
Houdaille-Hershey Corporation (3)
Howard Plating Industries, Inc.
Howell Company, The
Hub Plating Works
Hudson Motor Car Company
R. O. Hull & Company, Inc.
Hy-Grade Electroplating Company

Industrial Filter & Pump Manufacturing Company
International Business Machines Corporation
International Nickel Co., Inc., The (5)
International Silver Company

Jones & Laughlin Steel Corporation

Kaynide Div., Kraft Chemical Co.
Keeler Brass Company
Kelly Plating Company, The
Knape & Vogt Manufacturing Company
Knapp-Monarch Company
Knight Plating Company
Kocour Company
Kohler Company
Kuehne Manufacturing Company

Lasalco, Inc.
Lea Manufacturing Company, The
Leeds & Northrup Company
Chas. F. L'Hommedieu & Sons Company
A. J. Lynch & Company
Lyon, Incorporated

Mans & Waldstein Company
W. D. MacDermid Chemical Company
MacDermid, Incorporated
Magnuson Products Corporation
R. C. Mahoney
P. R. Mallory & Company, Inc.
Manderscheid Company, The
Matchless Metal Polish Company, The
Mattatuck Manufacturing Company
Maurer Supply Company
McGean Chemical Company, The
Meaker Company, The
Mechanical Plating Company
Mercil Plating Equipment Company
B. Mercil & Sons Plating Company
Metalcraft Corporation
Metallon Products, Inc.
Metal Mouldings Corporation
Metal Processing Company
Michigan Bumper Corporation
Michigan Chrome & Chemical Company
Midwest Chrome Process Company
J. C. Miller Company
Milwaukee Plating Company
Minneapolis-Honeywell Regulator Co.
Mitchell-Bradford Chemical Co., The
Modern Plating Company
Modern Plating Company, The
Modern Plating Corporation
Moore Drop Forging Company
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Mutual Chemical Company of America

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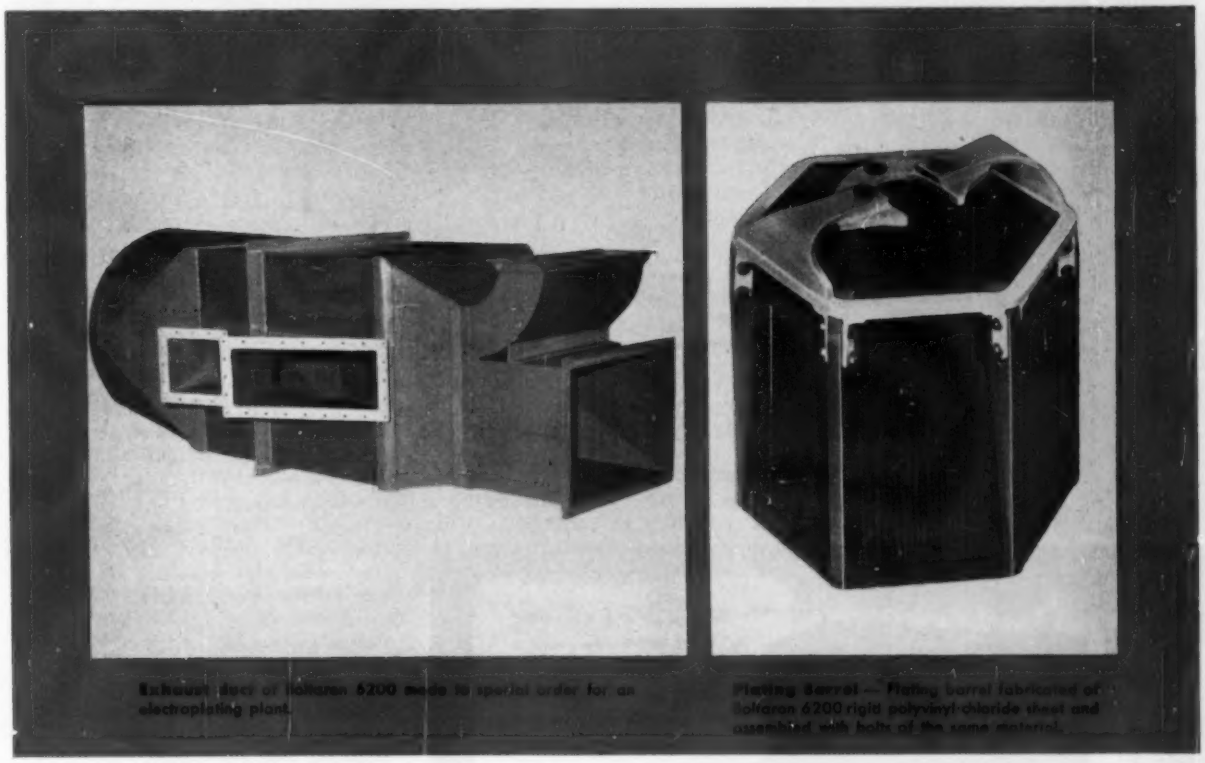

Exhaust duct of Boltaron 6200 made to special order for an electroplating plant.

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Boltaron 6200 is the outstanding corrosive-resistant material on the market today and retains the exceptional properties of unmodified Polyvinyl-Chloride. It is a superior, chemical resistant product particularly adaptable to the plating industry for exhaust systems, acid and alkali baths and for carrying corrosive solutions of all kinds.

Availability: *Sheet Stock* in sizes approximately 30″ x 60″ — 1/32″ to 1″ thick; *Bar Stock* in 10′ lengths, ¼″ to 1½″ in diameter; *Pipe* in ¼″ to 2″ sizes and in 10′ and 20′ lengths; may be threaded using ordinary pipe dies; *Fittings*, standard, threaded I.P.S. fittings carried in stock in ¼″ to 2″ sizes.

National distribution has been established through strategically located fabricators in the United States, selected and trained by the Hartwell Company to efficiently and economically use Boltaron 6200 for outstanding results. Direct your inquiries to

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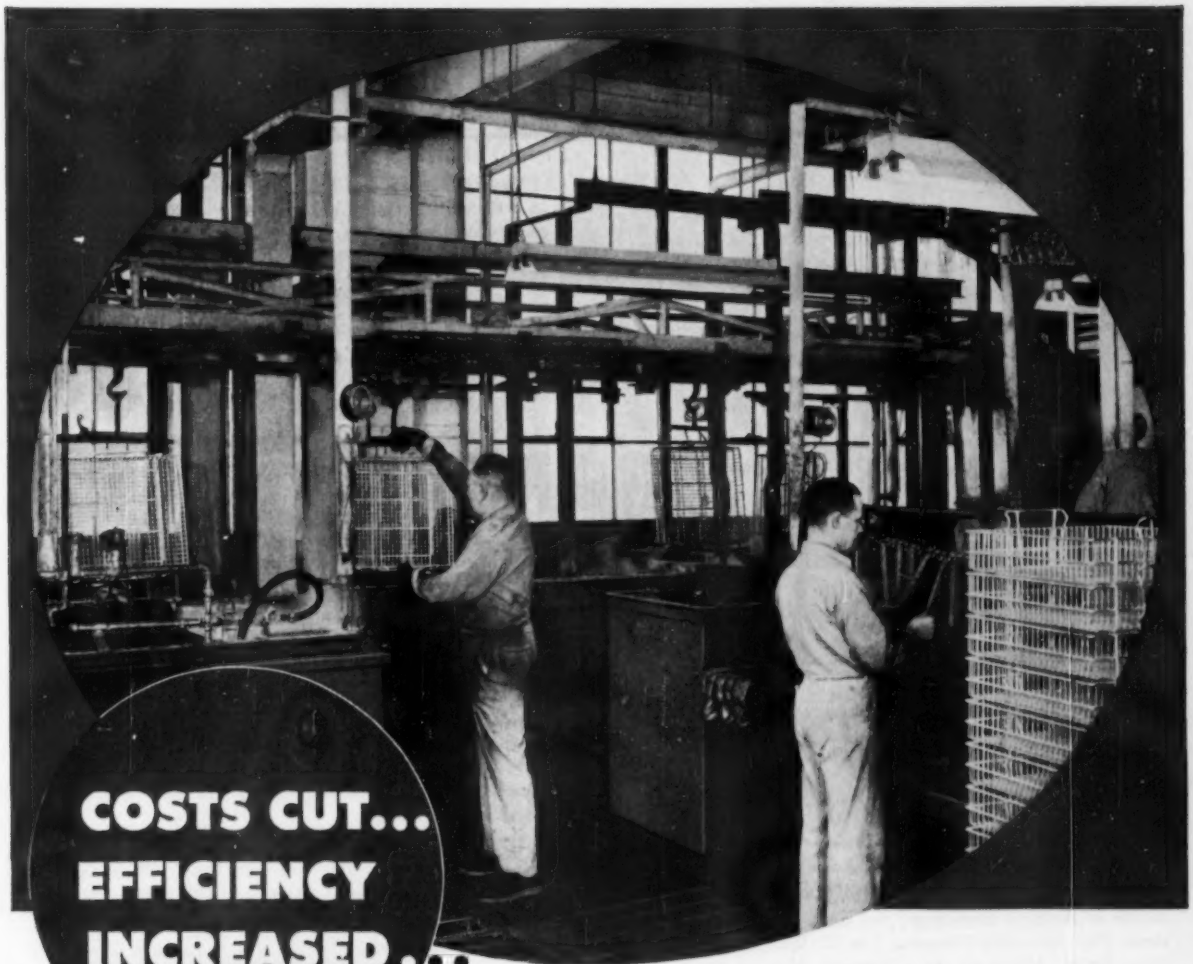

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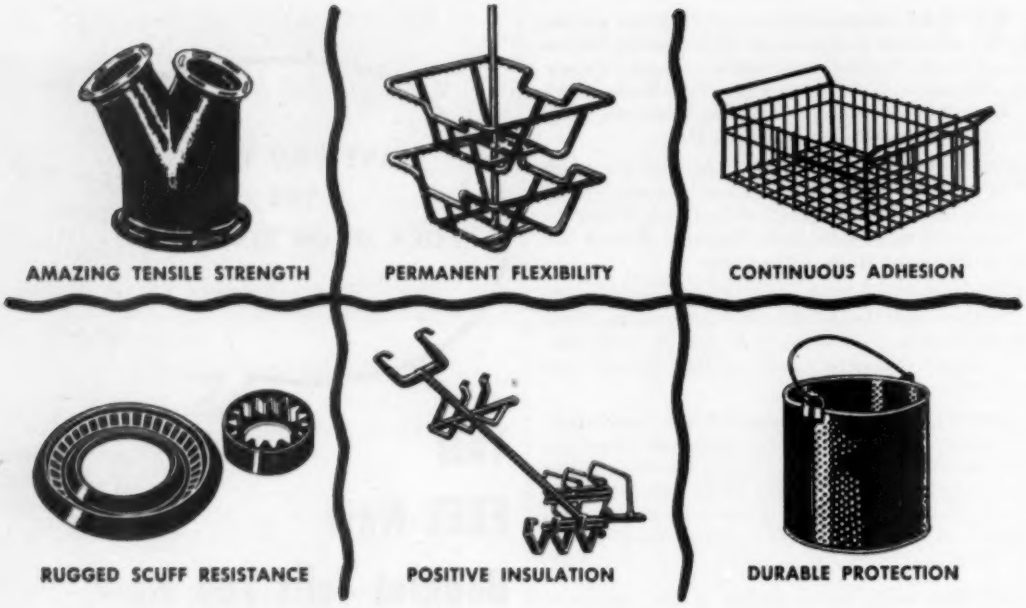

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Future Meetings

NEW YORK BRANCH, A. E. S., Annual Educational Meeting (2:00 P. M.) and Banquet (7:00 P. M.) at the Hotel Statler on February 14, 1953.

A. S. T. M. SPRING MEETING at the Hotel Statler, Detroit, Mich., March 2–6, 1953.

123RD NATIONAL MEETING, AMERICAN CHEMICAL SOCIETY, at Los Angeles, Calif., March 15–20, 1953.

CINCINNATI BRANCH, A. E. S., 1st Educational Session (2:00 P. M.) and Dinner-Dance (7:00 P. M.) at the Sheraton-Gibson Hotel on March 28, 1953.

BOSTON BRANCH, A. E. S., 17th Annual Educational Session (2:00 P. M.) and Banquet (7:00 P. M.) at the Statler Hotel on April 18, 1953.

DAYTON BRANCH, A. E. S., Annual Educational Session and Dinner-Dance at the Biltmore Hotel on April 18, 1953.

INDIANAPOLIS BRANCH, A. E. S., Annual Educational Session and Dinner-Dance at the Antlers Hotel on April 25, 1953.

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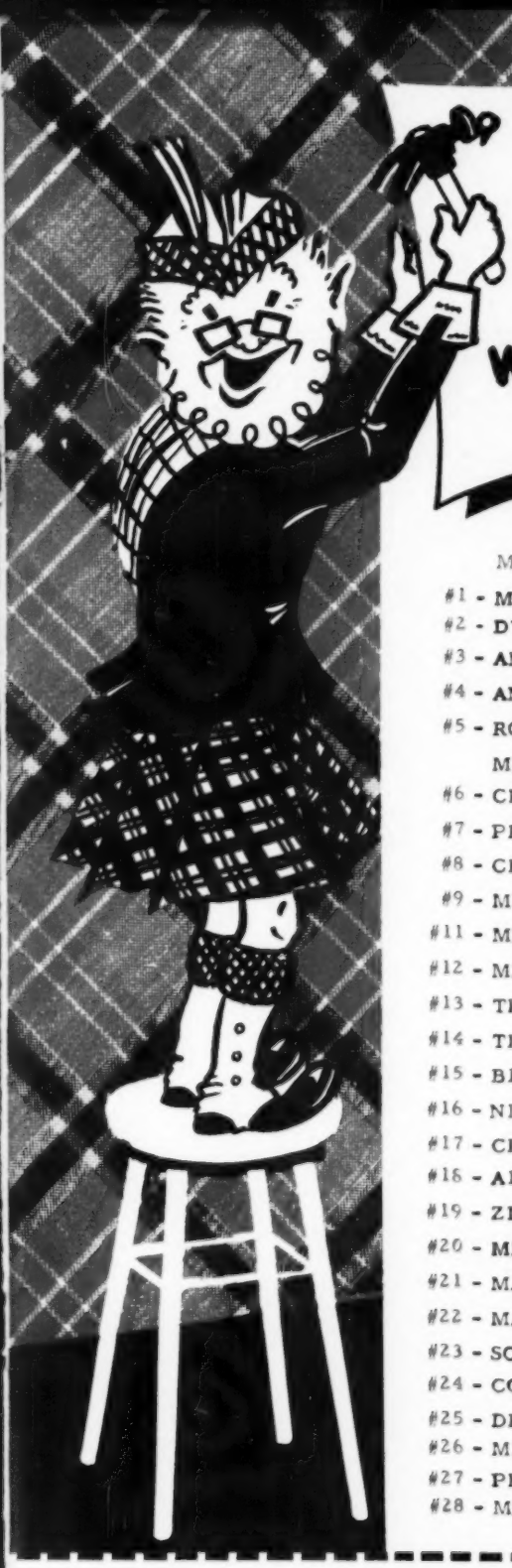

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#2 - DYCLENE "E" - Reverse Current Cleaner for Die Castings
#3 - ANODEX 61X - For Cleaning Buffed Copper
#4 - ANODEX - Reverse Current Cleaner for Steel
#5 - ROCHELTEX - For Copper Plating

MACDERMID BRIGHT COPPER PLATING PROCESS

#6 - CHROME RESISTEX - For Cleaning Prior to Chrome Plating
#7 - PRESSURE SPRAY WASHING MACHINE CLEANERS
#8 - CHROMETEX - Nickel Activator
#9 - METEX ACID ADDITIVE
#11 - METEX DURAFOS - Phosphate Coating
#12 - METEX PLASTIC STRIPPER
#13 - THE ALUMETEX PROCESS - For Electroplating on Aluminum
#14 - TROXIDE - Dry Acid Pickling Salt
#15 - BLACKMAX SALTS - Black Oxidizing Salts for Steel
#16 - NICKELEX STRIPPER - For Stripping Nickel Deposits from Steel Bases
#17 - CHROMEFOME - For Reducing Acid Mists
#18 - ALUM-I-NIEL - Acid Cleaning Compound
#19 - ZINCTEX - Zinc Addition Agent
#20 - METEX DB ACID ELECTROLYTIC STRIP
#21 - MACDERMID ALUMINUM BRIGHT DIP
#22 - MACDERMID ELECTROBUFFING SOLUTION - For Brightening Copper
#23 - SOLVENT EMULSION CLEANERS
#24 - COMPOUNDS FOR CLEANING ALUMINUM
#25 - DEOXIDEX - For Cleaning Aluminum for Spot Welding
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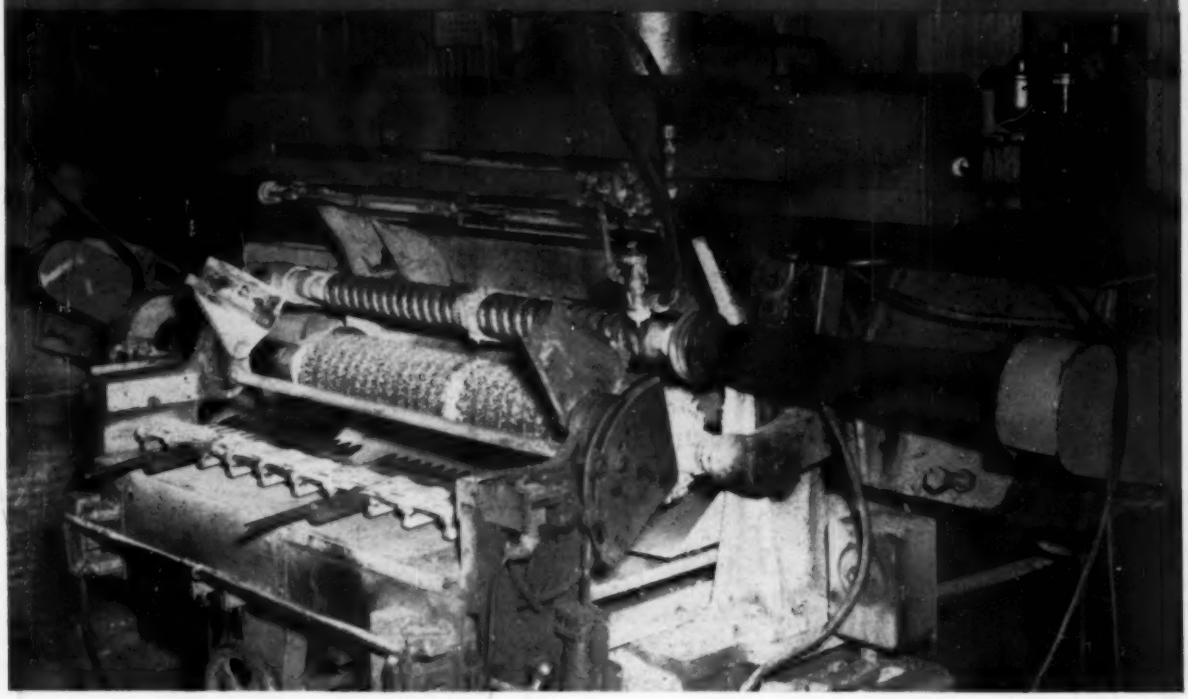

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